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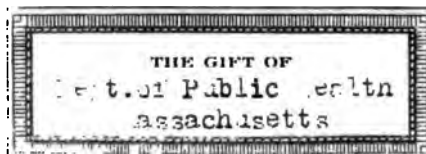
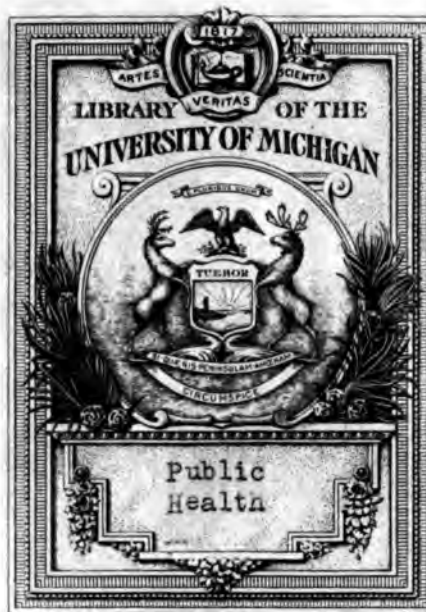
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PUBLIC DOCUMENT.....

.....No. 37.

SECOND ANNUAL REPORT

OF THE

Mass STATE BOARD OF HEALTH

OF

MASSACHUSETTS

JANUARY, 1871.

BOSTON:

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1871.

21

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GEORGE DERBY OF BOSTON, *Secretary.*

*Public Health
Gift
Mass. Dep. of Public Health
5-2-12*

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ERRATA.

In Typhoid table, pages 114 and 115:

Opposite Adams, for 7,475, read 747.

“ Fall River, for 17,451, read 17,481.

“ Montgomery, for 853, read 353; for 948, read 392.

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Commonwealth of Massachusetts.

BOSTON, Jan. 21, 1871.

HON. HORACE H. COOLIDGE, *President of the Senate of Massachusetts :*

SIR,—I have the honor to present to the Legislature the
Second Annual Report of the Massachusetts State Board of
Health.

Very respectfully,
Your obedient servant,

GEORGE DERBY,
Secretary of the State Board of Health.

GENERAL REPORT OF THE BOARD.

*To the Honorable the Senate and the House of Representatives
of Massachusetts :*

The State Board of Health, in presenting to the General Court its Second Annual Report, desires to acknowledge the courtesy and cordial reception it has met with from the civil authorities, and from the local boards of health of the towns of the Commonwealth. At the suggestion of this Board,* correspondents have been appointed by the authorities in various towns. These correspondents form an efficient body of aids. Their letters and other labors, some of which will be presented in this Report, have already added immensely to the power for really good sanitary work, which, through the liberality of the legislature, the Board has enjoyed. It is our hope that this corre-

* The following circular was sent to every town in January, 1870:—

[CIRCULAR.]

To the Board of Health of the of

GENTLEMEN,—The State Board of Health is desirous of establishing such communication with every city and town in Massachusetts that they may be able to investigate the causes of disease and death. They believe such causes to be often obscure when examined in detail, but that when grouped and classified in large numbers they sometimes reveal the existence of influences which have an important bearing upon public health, and the prevention of disease.

They would like to have a medical correspondent in every town, to whom they could apply for local information—some physician possessing your confidence, and who would be willing for the public good, to report to us facts relating to disease occurring within your jurisdiction.

Will you have the kindness to send us the name of some one physician, upon whose information we may rely, and who will be willing to perform the service to which we have referred?

In behalf of the State Board of Health,

Very respectfully yours,

GEORGE DERBY,
Secretary State Board of Health.

spondence and these labors will annually become more valuable contributions to scientific medicine and, at the same time, that they will tend to give more knowledge of sanitary matters to every citizen who wishes to educate his family to perfect health.

LEGISLATIVE RESULTS OF LAST YEAR'S LABORS.

Among the most agreeable results of the labors of the Board last year was the passage, by the legislature, of an Act of incorporation to enable certain persons to build an abattoir at Brighton. The same Act imposed upon the Board very important duties in reference to the building itself and to the establishment of sanitary rules upon which it was to be subsequently managed. We hailed this Act as one destined to bring great benefit to the comfort, health, and, we may add, to the wealth of Brighton. We regret to say that, as yet, no practical result has come from the Act, owing, as we have good reason for believing, to the persistent opposition of the butchers of that town. The Board desires to bring the subject again earnestly before the legislature and whole community, as well as before the citizens of Brighton.

We are informed that indictments are now pending against three or four slaughter-houses in Brighton as nuisances to the immediate neighborhood.

We may also remark that the building of an abattoir, with its thorough sanitary rules, is quite as important to the community at large, consumers of the meat slaughtered at Brighton, as to the inhabitants of that town. The Commissioners on Cattle have already ordered that no cattle shall be carried from Brighton. Many affected with the "foot and mouth disease" are liable to be slaughtered at private establishments, in different parts of the State and the meat then sent to the consumers, and eaten. This cannot be prevented until proper inspection before the killing of the animals can be enforced, as is now done in all the regularly constituted abattoirs of Europe.

In order to aid still further a true appreciation of the importance of this subject, we recommend the perusal of two reports presented this year, viz.: that upon the "Health of Towns" and that upon "Typhoid Fever in Massachusetts." In these reports, besides an immense mass of evidence going to prove the deleterious results arising from the decomposition of animal

refuse, some of our correspondents allude especially to the bad effects caused by proximity to slaughter-houses.

THE FOOT AND MOUTH DISEASE IN CATTLE. — ITS EFFECTS ON
MAN.

This subject, save in its immediate relation to man, has been examined by another board (Commissioners on the Cattle Disease), and efficient action has been taken thereupon. The disease has been prevalent for some time in New England. Every one naturally feels desirous of knowing what, if any, would be the effects of the use of milk from diseased cows, or from the eating of flesh of diseased cattle. The Board has had no opportunity to thoroughly investigate this subject in this State, although attention has been given to it during the past few weeks. Meanwhile we feel that it may be well to give a brief abstract of the results of English investigations.

It appears that, in consequence of the extensive prevalence of the disease, during the autumn of 1869, in various parts of England, the Privy Council determined to make a special examination of the question as to "the effects produced on the human subject by the use of milk derived from animals suffering" from this disease.

Dr. Thorne, the special investigator, visited at least thirteen towns, some of which had large populations. The evidence was conflicting, but Dr. Thorne feels justified in making the following inferences* as the conclusion at which he arrives:—

"I. That disease appears sometimes to have been produced in the human subject when the milk of cows suffering from foot and mouth disease has been freely used without being boiled. There is no evidence to show whether this affection is of a specific nature or not, but it seems to consist in a derangement of the alimentary canal, accompanied by febrile disturbance, the presence of vesicles on the mucous membrane of the mouth and tongue, which having ruptured, leave superficial ulcerations and, at times, a herpetic eruption (small water blisters) about the exterior of the lips.

"II. That in a very large number of cases the milk of cows undoubtedly affected has been used without producing any noticeable effects. This absence of results may, though only to an inconsider-

* Twelfth Report of Med. Officer, Privy Council, p. 298.

able extent, have been due to the smallness of the consumption and the boiling of the milk."

Mr. Simon, chief medical officer of the Council, in summing up the results, thinks that "dilution of the milk and mere lapse of time may have to be taken into account, and that milk which after dilution or after some hours' delay does not infect might have infected if taken neat or fresh." He is "clearly of the opinion that the milk of cows affected with the disease ought not to be unrestrictedly sold for human consumption."

While admitting that the disease as seen in man or animals is rarely, if ever, fatal, we deem it needful and proper to warn our citizens from using such milk, particularly for the food of young children.

In regard to the use of flesh of slaughtered diseased cattle, we must say that undoubtedly large quantities of it have been eaten in London and its vicinity, and there has been, according to Dr. Thorne, "no instance of any disease having been reported to him as resulting from the use of such meat." This statement is very different from asserting that disease never occurs; and we think that the fact that meat has been taken from diseased cattle should be of itself enough to condemn it. No meat should ever be allowed to leave the shambles in any part of this State without thorough inspection and permission for sale being given by a properly qualified person.

OVERCROWDING OF TENEMENT HOUSES, AND WANT OF CLEAN STREETS, &C., IN BOSTON.

In the month of July the Secretary of the Board called the attention of the members to the dangers liable to happen in Boston, from overcrowding in tenement houses, and from a want of cleanliness in alleys and streets. By a vote of the Board, the following letter was sent to the proper authorities:—

(COPY.)

TO THE BOARD OF ALDERMEN, *Health Commissioners of the City of Boston*:

The State Board of Health desire, respectfully, to call the attention of the health authorities of the city of Boston to the fact that the owners and keepers of tenement and lodging houses are not complying with the provisions of an Act of the legislature of 1868, chap. 281, General Statutes of Massachusetts. A large proportion

of the unfortunate poor are crowded into buildings whose construction sets at defiance the laws of health, whose yards and privies are filthy in the extreme, and whose general condition is such as to render them liable at any time to become centres from which pestilence may extend in every direction.

Very respectfully, your obedient servant,

(Signed)

GEORGE DERBY, M. D.,

Secretary of the State Board of Health.

BOSTON, July 11, 1870.

A reference to the report by the Secretary upon the health of the city of Boston will show the influence of this letter. It seems to have been small indeed.

SMALLPOX IN MASSACHUSETTS.

The certainty and commonly perfect innocuousness of vaccination have been established by the experience of nearly a century of its use. Overwhelming evidence has been presented recently by Mr. Simon (Twelfth Report of English Privy Council) that the fears of vaccination occasionally contaminating the system are really not well founded. There must be many now alive who have heard at least of the horrible results of smallpox ravages before Jenner lived. With all these well-known facts before us, it seems strange that any town could allow the pest to grow rampant as it has been recently allowed to become at Holyoke in this State. For over two months this loathsome disease has been spreading in that town, and now (Dec. 25th) infests every part of it. The Secretary has visited Holyoke and had an interview with the selectmen and physicians. At his suggestion, a thorough districting of the town was made, and every arm is to have its vaccine safeguard placed upon it. No amount of *disinfectants* can cope with this dire disease.

The only way to thoroughly drive it from the United States is by a national law, as in England, requiring every parent to duly register his child after having been duly vaccinated. Meanwhile the laws of our State in regard to unvaccinated children not being allowed to go to school, and other laws relative to infectious diseases must have been grossly neglected in Holyoke to have such an unhappy result as has taken place at that town, viz. : up to Dec. 31st one hundred and sixty-seven (167) cases of

smallpox have occurred, of which thirty-six (36) or about one-quarter proved fatal. There are doubtless many survivors also who have been disfigured for life by the disease. In connection with this statement, the Board draws attention to the fact that several of our correspondents (see Report on Health of Towns) allude to the indifference and neglect of the people in regard to vaccination as being quite general, and fraught with great danger to the people when the seed shall fall among them.

In the Massachusetts Registration Report for 1868, we find the following on vaccination:—

“In Ireland vaccination was made compulsory in 1863. Since that period the Irish Poor Law Commissioners have carried out the provisions of law and the whole population has been vaccinated. The results are seen in the following figures, from which it appears that the Irish physicians have banished the smallpox from their island as Saint Patrick is said to have banished the snakes. Whereas, in the periods 1830–40, 1840–50 and 1850–60, the respective annual average mortalities had been 5,800, 3,827 and 1,272, in the years 1864, 1865, 1866, 1867, 1868, they were 854, 347, 187, 20 and 19, respectively. In the first half of 1869 the whole number was three. The deaths from smallpox in Ireland since 1866 have been so few that it is fair to suppose the cases have been generally imported from abroad. The population being about five and a half millions, we should have, if equally well protected, about four deaths a year in Massachusetts.”

SPECIAL INVESTIGATIONS MADE UNDER DIRECTION OF THE BOARD DURING THE PRESENT YEAR.

The questions especially investigated either by individual members of the Board or by agents appointed by them are twelve in number. Some are of a more popular character and intended to diffuse information on sanitary matters among the people, while others are interesting to physicians chiefly. Most, if not all of them, however, contain more or less of the popular and also of the scientific element, and as such are commended not only to the notice of the legislature, but to that of every adult inhabitant in the State.

The following brief analysis is offered of these various papers:—

Poisoning by Lead.

By the Secretary, assisted by Prof. William Ripley Nichols, of the Massachusetts Institute of Technology, and by various Correspondents.

In this paper will be found correspondence from physicians in different towns of the State relative to their personal experiences. The essay is equally valuable to the student for the scientific thoroughness with which Professor Nichols has performed his part of the work, and to the citizen for the warnings it gives in regard to the employment of lead pipe for the conduction of water that is to be used for drinking or culinary purposes. It also presents facts regarding the danger incurred by those who drink cider or other acid drinks from faucets fastened with lead ; and other analogous facts tending to show the evil effects of cosmetics containing salts of lead.

Trichiniasis in Massachusetts.

By the Secretary.

The paper on this disease, which is caused by eating raw pork, or pork but partially cooked, is a frightful warning to the community. It should be carefully read by every parent when providing food for his family ; and the essential point of it, viz., the necessity of *thoroughly* cooking lean pork before placing it on the table, should be known and duly appreciated by every cook in the land.

Health of Towns.

Arranged by the Secretary, aided by our Correspondents.

This document, prepared from returns made by correspondents, contains facts and deductions therefrom. Among the returns specially noticeable may be named the influence of residence on river banks, near swamps, pigsties or foul privies ; details of wretched tenement houses (Boston) and stringent criticisms thereupon. In Brookline we see proof that the rich are more liable than the poor to some diseases ; and at Concord we have the evil influence of irregular flowing of lands by mill-dam corporations, and an admirable example of wise sanitary precautions used by a correspondent. At Hinsdale, the bad effect of overcrowding are found ; and at Hadley, the influence of too many shade-trees. In Northborough we have allusions to the effect of wet soil on the prevalence of consumption. Or town has its threatening of future pestilence unless bet

drainage be brought about by the citizens or by an active board of health. Suggestions in regard to infectiousness of consumption we have from Rockport. At Taunton our correspondent has opinions on the influence of a want of sunlight on the homestead. A gross neglect of vaccination is apparent in various towns, as Billerica, Holyoke,* Worcester, &c. The straw business as a cause of consumption appears at Upton. These are only a few of the variety of questions brought up by our correspondents. It is well for every one to look at his own town, and see if any nuisances exist there and afterwards do whatever can be done to remove any evil existing. The Board hopes eventually to have similar returns from all the towns. The continuation of such annual reports will tend to enlighten the public mind on all sanitary matters.

Charbon, or Malignant Vesicle, in Massachusetts.

By Arthur H. Nichols, M. D., of Boston.

This paper contains a *résumé* of the latest views on the idea of contagion. These views, though still in debate, are important as presenting one of the actual phases of thought on the all-important, but very profound questions involved in the terms "infection" and "contagion." While recommending therefore the paper to the consideration of our scientific investigators of disease, the Board feels that the practical suggestions made in regard to the necessity of cleanliness and of free ventilation are of equal value to the practical manufacturer and laborer. The suggestions also with regard to the free use of carbolic acid as a disinfectant should be known by all engaged in working on hair at Walpole and other towns, and they are worthy of serious consideration by every physician who is called to treat a case of charbon.

Typhoid Fever in Massachusetts.

By the Secretary, aided by our Correspondents.

This contribution to the etiology of typhoid fever made by various correspondents throughout the State, with the summary of inferences that can be drawn from the letters made by the Secretary of our Board is worthy of attention by every householder. Pittsfield, knowing too well the truth of two of the

* See also special remarks on smallpox at Holyoke.

inferences, viz., that fetid smells and impure water can alike produce typhoid fever of a most virulent type, has now its able and efficient board of health that foresees the evils threatened, and by determined action or timely warning arrests trouble. The State Board of Health feels that it cannot give any better advice than that every town should have an equally active board of health, and every inhabitant should read carefully the various letters, and, after doing so, should make his or her own inferences as to the condition and wants of his or her own town. The paper is also submitted to scientific investigators in the belief that, at least, it adds somewhat to our knowledge of the causes of this destructive disease.

Homes for the People.

The Chairman of the Board, having been obliged to reside during the past six months in London, availed himself of the opportunity thus offered of studying the homes of the poor of that metropolis and of learning what is now doing by public and by private philanthropy and capital in the matter of providing better homes for the people.

His letter to the Board presents the results of his investigations in reference to this most worthy object. The Board commend to the attention of the citizens the practical workings of the Peabody, Coutts and Waterlow buildings in fostering habits of cleanliness, temperance and self-respect among the people. To the last-named company, as proving that capital can combine with philanthropy, and each reap abundant harvests, the Board would especially call attention. Never was there a fairer chance or a greater necessity for similar operations than now exist in Boston.

The other subjects of Convalescent Homes in the country for broken-down but not really diseased persons, the matter of the use, waste and danger arising from Sewage, the Board deem worth the careful consideration of all.

The walks with the police in London and Boston, in their terrible and disgusting revelations, are solemn warnings, and, although perhaps to some minds, may seem ill-adapted for a report from a State Board of Health, are nevertheless entirely in accordance with the principles laid down in our first Report, as those upon which the Board was determined to act, viz. :

that "nothing which pertains to Humanity in its widest sense will this Board deem foreign to its aims."

Alcoholic Drinks. Their use and abuse.

With information derived from correspondence throughout the world.

The law establishing the Board requires it "to examine into and report what in their best judgment is the effect of intoxicating liquors as a beverage upon the industry, prosperity, happiness, health and lives of the citizens of the State. Also what additional legislation, if any is necessary in the premises."

These inquiries the Board deem of the highest importance. For years they have been the sources of violent language, or of party zeal alike in the privacy of home life, and upon the political arena. For years public sentiment in the Commonwealth has fluctuated between the extremes of action and of reaction on this matter. Meanwhile it seems certain that, while throughout the State there is less drunkenness than formerly, it never was more rampant than now in Boston and some of the larger cities. This habit the Board believe to be infinitely deleterious "to the prosperity, happiness, health and lives of the citizens." The records of our courts, and the knowledge which every one has of its effects in the private family assure us of this fact. *The evil is enormous.* How to remedy it is the difficulty.

In the hope of being able to lift the question of the use and abuse of intoxicating agencies above the region of partisanship and to enable the people of the Commonwealth to know how, more or less generally, human nature tends, the world over, to use and at the same time to fall into the vice of immoderate indulgence in intoxicating drinks, a circular was sent to the American Ministers at foreign courts, and to the Consuls of all the principal ports on the globe. It was designedly made as brief as possible—because we hoped thereby to get a greater number of responses than a more elaborate programme would have obtained. The Board presents the correspondence from Europe, Asia, Africa, North and South America, the isles of the Pacific, as well as from the State at large in the hope that the effort has not been in vain. From representatives of the United States in foreign countries we inquired what are the kinds of intoxicating drinks used, and what amount of crime do they

produce. These two questions it was unnecessary to put to our medical correspondents in Massachusetts who are more especially cognizant of the effects upon public health. Every member of this Board, and indeed every citizen knows that intoxicating drinks are the direct cause of a very large proportion of all the crime which is committed among us.

The foreign correspondence is not yet wholly finished. Letters have arrived within the past few days. It will therefore be impossible thoroughly to analyze the whole in all their various bearings. We hope to do this at a future time. Meanwhile certain general inferences we think can be drawn from this correspondence.

First.—Wherever we go, we observe that man finds some drink to use as a stimulus. Some nations use immoderately the more fiery, more potent liquors, and the results are infinitely more disastrous than are noticed among other nations using a milder beverage.

Second.—It would seem that the Northern nations of Europe, more especially the inhabitants of the British Isles and their descendants in America, tend to use immoderately these more violent liquors. The more Southern nations, except in the Southern States of this republic, use either milder articles altogether, or if perchance the stronger ones are drank, smaller glasses and fewer of them are taken.

Drunkenness is far less common among Southern than among Northern nations, but when it occurs is regarded with extreme aversion. It degrades its victims, in public estimation, in a far greater degree.

Third.—A curious physiological effect seems hinted at by some of our correspondents, viz.: that among Northern nations the vice of drunkenness is much more frequently the cause of violence and crime than in more Southern climes. In the North, men seem to become savage, wild and boisterous. The drunkard in the North beats his wife, and stabs his friend, or breaks into his neighbor's house under the influence of liquor. In the South he reels home rather happy in his insanity, and without any strong tendency to violence, or theft, or murder. We may add as a fact also that in *this* climate the Northern European cannot drink with impunity even that amount of alcohol he has all his life used in Europe.

Fourth.—It would seem from the correspondence that the practice of using stimulants is universal, and if unrestrained brings misery and death not only to him who indulges but often also to the community in which he lives.

If these conclusions are fairly deducible from such information as we have been able to collect from every part of the world, the question arises, what can we do to keep this universal tendency within proper bounds in Massachusetts?

The subject is, in some form, before the legislatures of all the States, and is everywhere recognized as one of difficulty. Men equally earnest in their desire to reach the evil differ in opinion as to the best means to be used. This Board can suggest no specific remedy: they have no sources of information which can give them any peculiar advantage in proposing the modification of existing statutes. The details of law are not within their proper province, but they do most earnestly desire and recommend that the legislature may devise some plan by which dram-shops, or tippling-houses may be summarily suppressed throughout the State.

Recognizing also that the love of strong drink becomes at times a real disease, and as such controls its victims as completely as insanity can ever do, this Board earnestly urges upon the legislature the establishment of inebriate asylums, to be held as insane asylums are now established and held, under State guardianship, in various parts of the Commonwealth.

Mortality of the City of Boston.

Prepared by the Secretary, assisted by Frank W. Draper, M. D., of Boston.

This paper is presented in the conviction that from it may be deduced inferences of great importance to the future health not only of the city but of that of the State at large. The Board hopes that similar "health districting" of the various towns in the Commonwealth will be undertaken by the local boards of health. No more valuable work could be inaugurated. If such investigations were carried on thoroughly and conscientiously by every nation in all their various townships, we should, in ten years, know more certainly about many *causes* of disease than the medical profession has been able by its own unaided efforts to arrive at during the centuries of its existence. The deductions made by our Secretary from the

tables of Dr. Draper are few compared with what may possibly be drawn from them, but although few, they unmistakably point to the fearful neglect of the city authorities of Boston in reference to the sanitary condition of the metropolis; and the terrible penalty for this neglect is daily and hourly paid at the present time by the sacrifice of human life.

The remarks of the Secretary on the fact that houses are now *allowed by the city authorities to be built on land in a certain portion of the city that must be eventually raised at an enormous expense*, the Board submits with deference to the taxpayers of Boston as worthy of their especial notice, in order that the evil may be promptly checked. Unless this be done, a deteriorated sanitary condition of the inhabitants of the district will be the inevitable result.

Ventilation of School-Houses.

By A. C. Martin, Architect, of Boston.

This paper is based upon scientific principles relating to ventilation, and presents plans for carrying out the design in a practical way.

In most of our school-houses the object seems to be to get heat enough at any rate, and if ventilation is considered at all it is regarded as of secondary importance. Our school-houses are charged with carbonic acid gas and animal effluvia which undermine the health of both teachers and scholars. The removal of such deleterious influences is surely greatly to be desired.

We deem it important to remind those who have charge of the warming and ventilation of schools that it is no easy or simple matter, in our variable climate, to maintain a uniform temperature, and at the same time renew the air with such frequency as health requires. No methods of warming and ventilating the two and three story school-houses which it is now customary to build in our large towns, can be reasonably expected to be otherwise than expensive, and whatever they may be, they need the constant care of intelligent persons to insure their proper working.

The plans of Mr. Martin are believed to meet the necessities of the case.

Mystic Pond Water.

By the Secretary, assisted by Prof. Wm. Ripley Nichols, Massachusetts Institute of Technology.

The Board commends this paper to the notice of the scientist as well as to that of the citizen. It shows how a pollution which, at first sight, it would seem must necessarily cause contamination to the drinking water of several towns is rendered by the alchemy of nature, at present at least, comparatively harmless. At the same time it forewarns us of what must certainly occur if we allow the present impurities of Mystic Pond to be increased, by new and more numerous nuisances in the form of the refuse of tanneries, &c., being thrown into it. For a still further reason, the Board urges removal even of the present small nuisance, because the very filth, which tends to contaminate, might be saved and used for beneficial purposes, whereas it is now lost and at the cost, perhaps, of human health and life. For it is undoubtedly true that the very refuse which may tend to contaminate the drinking water of the citizens of Charlestown and of other populous places, might be used as a fertilizer by the farmer, or perchance in some operations in the various manufactories of the State.

Air and some of its Impurities.

By the Secretary, assisted by Messrs. A. H. Pearson, H. B. Hill, and Charles Stodder.

This article comprises a contribution to our accurate knowledge, of the amounts of carbonic acid gas contained in various open places in the cities of Boston and Cambridge, compared with what is found in our schools, churches, halls, theatres, &c. It is a record of carefully conducted experiments, and will, we hope, commend itself to American and European investigators on the subject. It is interesting also to every one, even though he be not occupied with the scientific view of the matter, to observe how this deleterious gas collects in all badly ventilated places.

The letter from Mr. Stodder is a truthful statement of the views of an experienced microscopist, upon the difficulties connected with microscopic investigations relative to the "germ" theory of disease. Although it seems to teach us but little on that subject, it does us substantial service when it tends to

check the exuberant imaginations of many about "organic germs," of which we have heard so much the past year.

The practical suggestion also of the possibility of preventing the dust, of iron and steel filings, from flying about the air of machine shops, and thereby saving life by means of magnets, is worthy of the attention of master-machinists who desire to promote the well-being of their operatives.

*Health of Minors Employed in Manufactories of Cotton,
Woollen, Silk, Flax and Jute.*

By the Secretary, assisted by Frank W. Draper, M. D., of Boston.

This report is from the nature of the case imperfect. The difficulty in procuring the required information has been great. From many factories it has been found impossible to get returns. For this reason the subject cannot be said to be completely examined, and its great importance demands still further investigation.

Meanwhile it is gratifying to the Board to find that with these imperfect returns, there is no suggestion of the existence of greater mortality or sickness, among the operatives than in the State at large.

In reading this report the Board feels the great importance of the question, now much debated in Europe, as to the registration of disease. If every corporation in the State were obliged by law, under a penalty for non-performance of the duty, to make annual returns of the number of days lost by their employes by reason of sickness, and if all hospitals and dispensaries were required to give similar information, a great deal might be learned important to the future health of our citizens.

Sewing Machines.

Early in the year the Board took measures for careful investigation, as to the truth or otherwise, of the statement widely circulated, that constant labor by women on sewing machines moved by foot-power, was undermining health, and was productive of various complaints peculiar to women. They engaged a physician of experience and skill, and having a wide practice among the operatives of one of the cities of the State to report upon the subject. The importance of the matter is understood

by the Board, and they regret to say that only within the past few days has the gentleman found himself unable to perform the services agreed upon. At present, owing to lack of the time necessary to make a complete examination, it is impossible to do more than to promise information on this subject as soon as it may be obtained, and, if deemed of sufficient importance, some publication may be made before our next annual report.

EXPENSES OF THE BOARD.

It will be seen by the following statement of accounts that our Board has expended \$2,288.35, which is less than half of the sum which the legislature appropriated for our use in 1870.

We trust that the same liberality and the same generous confidence in the intentions of the Board will be continued in 1871. It is always necessary to have some reserved fund for extra work which may suddenly occur.

The Secretary has already in behalf of the Board asked for an appropriation equal to the sum granted last year. If this be allowed, we shall promptly enter upon new tasks and with renewed zeal; in full confidence that all money expended by us will in the end be amply repaid to the State.

All which is respectfully submitted.

HENRY I. BOWDITCH,
P. EMORY ALDRICH,
WARREN SAWYER,
GEORGE DERBY,
WM. C. CHAPIN,
RICHARD FROTHINGHAM,
R. T. DAVIS,

Members of the Massachusetts State Board of Health.

BOSTON, January 18, 1871.

EXPENSES OF STATE BOARD OF HEALTH—1870.

Postages and stationery,	\$429,28
Travelling expenses of Secretary,	57 59
Express charges and soldier messengers,	57 60
Printing,	100 86
Personal expenses of members while engaged in the duties of the Board,	148 29
Paid for special investigations,—	
Concerning Air,	271 66
Water,	200 00
Charbon,	125 00
Ventilation of school-houses,	125 00
Mortality of Boston,	255 00
Typhoid fever,	108 50
Health of factory operatives,	30 00
Furniture and philosophical apparatus,	98 92
Copying, translating, &c.,	210 90
Miscellaneous,	74 75
	<hr/>
	\$2,288 35

REPORT OF THE SECRETARY.

To the State Board of Health.

GENTLEMEN :—I have occasion to add but little to the record of the year's work which is presented in the accompanying reports.

An extensive correspondence has been kept up with all parts of the State, and many visits have been made to the different towns, for the purpose of consultation with the local boards of health.

I have lectured on subjects connected with public health in Amherst, Springfield, Boston, Worcester, Charlestown, Salem and Lowell. It gives me pleasure to assure you that everywhere I have met with evidence of the great interest which is felt in the operations of our Board by the selectmen of towns, members of the medical profession, and by the people generally.

Physicians are the natural guardians of public health. They know better than any other class in the community that many diseases are avoidable—that it is easier to keep well than to get well—that prevention is better than cure. These convictions have led them to co-operate most heartily in the inquiries undertaken by our Board. Two hundred physicians, in as many different towns, have contributed information on the special subjects investigated in the following pages. Many of these gentlemen are of eminence in their profession, and their practice and observation may be said to extend over nearly the whole territory of Massachusetts. In many instances the smaller towns have no resident physician. In the letters of our correspondents, as arranged for publication, I have separated the various topics, that each subject standing by itself might be the better understood.

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The report of deaths from all prevalent diseases in the largest cities and towns, has been published every Wednesday during the year in the Boston Morning "Journal." I desire to express my thanks to the clerks and registrars who have aided me in collecting this information.

Very respectfully, your obedient servant,

GEORGE DERBY,

Secretary of the State Board of Health.

Boston, January 18, 1871.

POISONING BY LEAD PIPE

USED FOR THE

CONVEYANCE OF DRINKING WATER.

POISONING BY LEAD PIPE.

One of the questions addressed to our correspondents, in the circular of April 8, 1870, was as follows:

“Have any cases of lead colic or lead paralysis occurred in your town or district, in which you have been able to trace the origin of the disease to water-pipes?”

The replies are from one hundred and seventy correspondents, in as many different places, and are as follows:

Yes,	.	.	.	.	.	.	.	41
No,	.	.	.	.	.	.	.	101
Doubt expressed,	.	.	.	.	.	.	.	20
No lead used in the town,	.	.	.	.	.	.	.	8

It is stated that in certain towns lead pipe is only used to convey water from springs, and that, when allowed to flow continually without plugs or stop-cocks, no harm has been known to follow.

The negative replies are very brief, and may be construed as meaning generally that no bad effects have been observed, rather than that, in the opinion of the writers, none may occur from the contact of drinking water and metallic lead.

The affirmative replies are direct and positive, and are usually accompanied by evidence. They occasionally refer to other accidental modes of poisoning by lead, as by hair-dyes, which are almost universally composed of acetate of lead and sulphur in various proportions; also by cider and vinegar drawn through lead faucets.

Information relating to this general subject is given in the following extracts from letters of our correspondents:—

Ashland.—Three cases of lead poisoning through water-pipes are reported. Two, which occurred eighteen months ago, were in the same family: a father, aged sixty, and his daughter, aged twenty-four. The latter was the first affected, and her case for a considerable time was obscure. "She had no colic from first to last, but a series of indefinite ailments for which three of us physicians could assign no satisfactory cause; anæmia, pain in epigastrium, with nausea and vomiting, neuralgia occasionally in limbs and chest; bowels not constipated. Gastric ulcer, or carcinoma, were suspected. Lead poison was thought of, but there being no blue line on the gums, and no paralysis, the idea was given up. About the fifth month amaurosis occurred; but we groped in the dark three weeks longer. At this time her father was attacked with severe colic, and as the bowels were constipated, I examined the gums and found a well-marked blue line." The mystery was solved. The drinking water was brought into the house through fifty feet of lead pipe from a well in the stable. The daughter subsequently had wrist-drop. On removal of the cause, and with appropriate remedies, both father and daughter completely recovered.

The third case was in January, 1870. A French Canadian, aged thirty, exhibited the characteristic signs of lead poison, colic of great severity, constipation, blue line of the gums. The cause of these symptoms was found in the drinking water, which was brought into the house from a well, through forty feet of lead pipe. This water had also to flow through a box in the cellar, as large as a water pail, which was lined with lead. On removal of these causes, and with appropriate remedies, this case also recovered.

Amherst.—Two cases are reported; one of them having all the characteristic signs, — colic, constipation, partial paralysis, lead jaundice, blue line of gums. Analysis of drinking water in both cases yielded confirmatory evidence of the presence of lead, and both cases recovered on removal of cause.

"The water of our wells and springs in this neighborhood, especially in gravelly soil, is characterized by the presence, in large amount, of carbonic acid, and an almost absolute absence of sulphates."

Abington.—Our correspondent reports a case of lead paralysis, caused by drinking water conveyed four rods through lead pipe. Now under treatment.

Athol.—No cases have come under the immediate observation of our correspondent; but three cases in one family occurred in the

town two or three years ago, in which the disease was directly traced to lead water-pipes. In one of the cases there was partial paralysis.

Andover.—Lead water-pipes are very generally used, but no cases of colic or paralysis have resulted from it. In some instances, injury to health from their use was suspected. The pipes are often found much oxidized.

Attleborough.—In one instance, repeated attacks of abdominal pain ceased to recur after the removal of lead pipe from the well. In another, where the general health was undermined, with paralysis of the extensors of both arms, recovery commenced after the use of water conveyed through lead pipe was discontinued.

Barre.—Case of a middle-aged man, long sick and treated for rheumatism; finally there was partial paralysis of both wrists and ankles. He used water conveyed through lead pipe. Removal of the pipe, which was found to be very much corroded, and in some places nearly perforated, was followed by gradual, though incomplete recovery. He subsequently died suddenly, and, as reported, from pleurisy.

Brimfield.—One case reported with unmistakable signs of lead poisoning. Advised giving up use of water conveyed through lead pipe, but the man persisted in using it; and, finally, died unconvinced. A large proportion of people in this town use lead pipe for conveying water and do not suffer from it.

Bridgewater.—A case is reported of a boy eight years old, who had epileptiform convulsions, gradual decline, partial loss of speech and power of motion. The cause was not suspected for a long time, but when at last discovered and the lead pipe removed from the well, the boy completely recovered.

Nearly all lead pipes are now removed from wells in this vicinity.

Blackstone.—"I have been able, I think, to trace several cases of lead paralysis to the use of some of the hair preparations now in use. Cannot say that I have been able to trace it to water drawn through lead pipe."

Concord.—Our correspondent has met with no cases of lead disease from water pipes for some years past, but furnishes a report

of several which occurred in his practice in 1853, and expresses his opinion that similar instances of lead poison occur more frequently than is generally supposed, the cause being unrecognized. In the cases referred to, four persons were afflicted with lead disease, and brought near to death by drinking water conveyed through lead. The water was found to be charged with salts of iron from a meadow in which existed a bed of iron ore, and through its action upon the pipes, soluble salts of lead were produced in abundance. Removal of the pipe was followed by recovery of health.

Erving.—"The only cases of poisoning from lead pipe which I have observed here were caused by drinking cider drawn through a lead syphon which was allowed to remain in the barrel."

Essex.—One case reported. A man about fifty years of age was subject to attacks of epigastric pain and neuralgia. Cause not suspected until the extensor muscles of the arm became paralyzed. It was then found that he was drinking water conveyed twelve or fifteen rods through lead pipe. This being discontinued he gradually recovered.

Fitchburg.—A good many cases of lead disease, supposed to be from the use of lead water-pipes, occurred from ten to eighteen years ago, but none recently. The use of lead water-pipes is not wholly abandoned, but medical and popular discussion of the subject has greatly diminished their use, and very generally induced more caution.

Framingham.—Nearly all the members of one family have suffered from the various forms of lead disease, traced directly to the influence of water conveyed through lead pipe.

Gloucester.—"I have met with some three or four cases of disease occasioned by drinking water drawn through lead pipe. The symptoms, at first, were generally colic and constipation. This has been followed by partial paralysis.

"In one case the patient was the only one affected out of a large number who used the water. He had paralysis of the extremities, persisting for two months. That the lead poisoning was due to the pipe seems to me evident from the fact that a recurrence of the primary symptoms supervened upon resuming the use of the water drawn through the lead pipe, which speedily subsided on discontinuing its use."

Groton.—Several cases of lead poison from water are remembered. In one, the case was treated for three years unsuccessfully, the cause not being recognized. Recovery followed rapidly on removal of lead pipe used for conveyance of water thirty rods.

Hubbardston.—"I have seen, during my practice in this town, two cases of partial paralysis which I believe to be due to the presence of lead in the system; and I am confident they occurred from the excessive and continued use of hair-coloring and hair-dressing preparations containing lead in solution. Both cases recovered on discontinuing their use."

Holyoke.—"In 1867 and 1868 a case was under my observation of gastric and intestinal derangement, with impaired use of the forearms and hands, which I suspected came from using water drawn through lead pipe. The service pipe was changed and the case was discharged cured some weeks afterwards."

Hyde Park.—A number of cases of suspected lead poisoning have been seen to improve after the removal of lead pipe from contact with drinking water.

Leverett.—Several cases have occurred. One of a lady who suffered for two years from partial paralysis of arms, and other equally marked signs of lead poison, and recovered her health after the removal of forty rods of lead pipe through which drinking water was conveyed. Another of a very similar kind, but in a different locality, with colic, great debility and finally "drop-wrist," from which recovery was speedy on removal of the lead pipe. Our correspondent has also met with cases of lead poison from the use of hair-dyes composed of sugar of lead and sulphur.

Our correspondent expresses the most decided opinions on the general subject of lead poison through water-pipes and hair-dyes, and believes that very large numbers of persons are unconsciously undermining their health through minute doses of lead administered in this way.

Monson.—One well marked case of lead poison in an excessive water drinker who got his supply through one hundred rods of lead pipe with very little fall. Lead water-pipe in very general use, but the above case the only one in which harm has been known to result from it. A fatal case of lead disease reported from the use of cider drawn from the barrel through a lead faucet.

North Andover.—A case of lead disease reported by our correspondent, from the use of a chain-pump, about which lead was used to prevent the water leaking down the chain.

North Adams.—In the course of twenty-five years' practice, some cases are recalled of illness supposed to be caused by water conveyed through lead pipe.

Northampton.—"The following cases of lead poisoning from the use of water drawn through leaden pipes are brought to the notice of your Board, as a matter peculiarly pertaining to the public health. The neighborhood in which the suffering family reside is very generally using water drawn through lead pipes, and is not disposed to accept the theory of poisoning from this source. The family of Mr. H., consisting of himself, wife, daughter and son-in-law, reside in Westhampton. Mr. H. removed to the farm he now occupies, seven years ago. Mrs. H. has lived on the place many years with her daughter; and the son-in-law, Mr. E., joined the family in November, 1868. Mr. H., aged fifty-seven years, had always enjoyed good health until the spring of 1869. Early in May he found himself losing flesh and strength, tormented continually with an unpleasant constriction and pinching in the abdomen and with pains in the extremities, not following the course of any of the large nerve trunks. June 19, he had an attack of colic so severe as to require the attention of his family physician. These attacks were repeated many times, and accompanied with obstinate constipation and nausea for many days. The abdomen was uniformly and considerably depressed and the blue line on the edge of the gums well marked.

"Mrs. H., aged fifty-seven, with good general health heretofore, had similar symptoms. Mr. E., the son-in-law, was still more severely afflicted, being extremely emaciated and feeble. His general appearance was like that of one suffering from malignant disease, and without the blue line and the family history to aid me in the diagnosis, I should have expected to find a cancerous development somewhere. The source of all this trouble was near at hand. The water which the family used was drawn from a well in the cellar through a one and a half inch pipe, extending from the bottom of the well to the sink in the kitchen, about forty feet. This same arrangement had been in use in this house for twenty-four years. The well was walled up with brick, fed from a spring at the bottom, and the water stood generally about six feet deep. The lead pipe passed through the wall above the surface of the water

then down to within six inches of the bottom of the well. The water in this well, as in the neighborhood generally, percolates through a gravel subsoil and is called *soft*. The surface of the pipe inside and out was coated with a carbonate of lead, and in several places the pipe was much eroded. The water was analyzed by the professor of chemistry at the Agricultural College, Amherst, and reported by him to give evidence of holding lead in solution, with an unusual quantity of free carbonic acid. These cases all recovered completely on removal of the cause of their illness and with appropriate treatment.

✓ "This question may be pertinent. How does it happen that this water has been used by one member of the family (Mrs. H.) for twenty-four years without evidence of poisoning, and then all the family suffer about the same time? I have only one explanation to offer, which may or may not be correct. The wooden cover had become decayed and portions of it had fallen into the well. The decomposing wood had supplied the excess of carbonic acid gas necessary to act upon the leaden pipe."

Northborough.—"I can recall eight cases of lead colic where the unmistakable cause was drinking water pumped through lead pipe; three cases from water from an aqueduct, two cases from water drawn from a well with a bucket made from a whitelead keg, and one case caused by drinking cider drawn through a lead faucet."

Pepperell.—"I have now under treatment several cases of partial paralysis, caused, I have no doubt, by the use of water taken through lead pipe. The most prominent symptoms are these: *mental depression*; paralysis more or less complete of the extensor muscles of the forearm, with dropping of the wrists; inconvenience in walking over uneven surfaces, there being inability to extend the foot to avoid accidents; distinct blue line along the margin of the gums.

"In no instance had these persons come in contact with any form of lead in an unusual manner, except by lead pipe being used to convey water for domestic use. These cases are peculiarly interesting to me, witnessing, as I do, the effects upon different members of the same family."

Rutland.—"Lead pipes for pumps and aqueducts are in universal use. No instance of lead colic or paralysis has occurred to my knowledge in the last twenty years."

Sherborn.—"I remember but one case in which poisoning from lead water-pipe was suspected. There was temporary paralysis of the extensor muscles of the arm and the blue line on the gums. The patient was a boy and made a good recovery after treatment and the removal of the lead pipe. No other member of his family was affected. Lead pipe for the conveyance of water is very generally used here."

Shelburne.—"I have known four cases of lead colic, two of them complicated with paralysis. Three recovered and one died. All of these persons used water from lead pipes."

Sterling.—"I am convinced that the universal use of lead pipe for water conduits has had a prejudicial effect on the health of the people of this town in years past and evidences of lead poisoning are apparent in some patients now under my treatment."

Sudbury.—"In forty years' observation no cases of lead colic or lead paralysis have been seen which could be directly traced to water pipes, but our correspondent believes lead to be an unsafe metal to be used for the conveyance of water, and is recommending its removal and the substitution of other materials free from the suspicion of danger."

Taunton.—"A few cases of paralysis from the absorption of lead, supposed to come from lead pipes and cisterns, have been observed."

Tewksbury.—"A case is reported of lead poisoning from long continued use of a hair-dye containing sugar of lead."

Uxbridge.—"No case of lead poisoning from water pipes known to have occurred in Uxbridge, but in a neighboring town two cases were recently seen by our correspondent. Water was brought from a well through lead pipe, and produced in one instance lead colic and in the other "drop-wrist" before the cause was discovered. The water treated with sulphuretted hydrogen showed the presence of lead in abundance."

Upton.—"One case reported by our correspondent as distinctly traceable to lead-pipe water. Other cases of colic and partial paralysis have occurred in which this cause was suspected but not proved."

Ware.—A case of neuralgia in which lead disease from water pipes is suspected, now under observation. Our correspondent in Ware reports a case of lead disease, although not from water pipes, which is curious and instructive.

“An old gentleman, a farmer, had colic, constipation and finally drop-wrist. It took me a long time to find out from whence the lead which had evidently caused these symptoms could possibly be obtained, as the water was from an old oaken bucket and no paint was used about the house or on any of the cooking utensils. But I made every inquiry and at last discovered that the old man was fond of vinegar and water, sweetened, for a drink; and thinking it nicer freshly drawn, was in the habit of going to his barrel and drawing a little into his glass through a lead faucet!

“This source of danger in his case came very near being an unsolved mystery, but happily it was at last made manifest.”

Watertown and Belmont.—Lead disease occasionally seen and almost without exception in the form of colic. Several cases reported. A middle-aged man, a shoemaker, lived with his wife for three years in a house supplied with water through lead pipe. He had no family. The wife, with more active habits, never showed distinctive signs of lead poison, but was never quite well. The husband had lead colic of the most violent and obstinate character. Another case was of a little girl who was constantly drinking from the faucet which supplied the basin in her mother's chamber. The lining of the tank from which the water was drawn was found to be oxidized.

In a second letter our correspondent says: “I think I stated that I had seen the effects of lead poisoning manifested almost invariably in the form of colic. I now recall a single exception, which was the case of a lady who suffered from a neuralgic affection of the limbs, especially the arms, which were lame, painful and weak. The water she had been in the habit of drinking was found to contain a large proportion of lead. The use of lead-water was discontinued and the symptoms eventually disappeared.

“One case more of suspected lead affection, that of a woman who was teased and annoyed for a long period by abdominal pains, not severe and sharp like those of ordinary colic but dull and wearing. I believed the cause of this trouble to be the use of water which came from a painted roof. She recovered perfectly.”

Wakefield.—Two families affected; both entirely recovered on

removal of the lead pipe. In one of these cases there was paralysis of the extensor muscles of both hands.

Webster.—"There have been several cases of colic and a few cases of paralysis in this vicinity, directly traceable to the use of water drawn through lead pipe. A case of lead paralysis caused by drinking cider drawn through a lead faucet was also under my observation a few years ago."

Waltham.—Several cases of lead poisoning from water pipes occurred in this town in the practice of the late Dr. Horatio Adams, and were published by him in the Transactions of the American Medical Association, Vol. 5. Our correspondent has recently seen a case which was caused by water drawn through lead pipe from a brick cemented cistern.

Westminster.—Two cases of lead palsy traced to the use of water drawn through lead pipe. Extensor muscles affected. One was relieved by omitting the water; the other was incredulous as to the cause of his trouble, and has been permanently injured. He has had "wrist-drop" for several years.

West Boylston.—Some cases of lead disease from water-pipes have been seen, but they are not common. People are beginning to understand that water confined in lead pipes is dangerous, and are more careful than formerly. Our correspondent has seen paralysis, colic, a blue streak around the gums, costiveness and extreme emaciation caused by drinking water that had been stagnant in lead pipes.

Wilbraham.—One case of facial paralysis observed which was supposed to be due to the use of hair-dyes.

Worcester.—No cases of lead poisoning from water pipes observed since the introduction of "city water." Before its introduction many cases of colic and partial paralysis were seen, apparently due to lead pipe in wells. On removal of the suspected cause the symptoms disappeared.

Wrentham.—"Instances have occurred where I think I have been able to trace the origin of disease to lead water-pipes. There is a hilly section where a dozen families are supplied with water from an excellent spring, a fourth of a mile above them. It is brought through lead pipe. These houses are also supplied with

good wells. I think I am correct in saying that every one who uses the water conveyed through the lead pipe for any time is injured by it. The complaints are varied; generally abdominal pain and neuralgia. Lately I have in a measure dissuaded the people from its use. The flow is not constant; it only moves as it is drawn upon."

In addition to this information directly from the towns, there are many similar cases reported in the "Boston Medical and Surgical Journal" as having occurred in Massachusetts during the past fifteen years. They are of the same general character as those already given, and it is therefore unnecessary to reproduce them. They may be found in Vol. LIV. p. 21; Vol. LV. p. 428; Vol. LVI. p. 422; Vol. LVII. p. 368; Vol. LIX. p. 99; Vol. LXI. p. 480; Vol. LXXVI. p. 37.

The Transactions of the American Medical Association, Vol. V., also contains a report on the subject, with many interesting cases occurring in the neighborhood of Boston, by the late Dr. Horatio Adams of Waltham.

The special action of the water of Lake Cochituate (Boston water) on lead pipe, and the amount of lead it is capable of dissolving under various circumstances, have been investigated, by request of the State Board of Health, by Mr. Wm. Ripley Nichols, Assistant Professor of General Chemistry in the Massachusetts Institute of Technology, who presents the following

REPORT:

GEORGE DERBY, M. D., *Secretary of Mass. State Board of Health:*

DEAR SIR,—At your request I have made a number of determinations of the amount of lead contained in Cochituate water under the ordinary circumstances of its use; and in this connection I would present the following statement with regard to the action of water on lead in general:—

Perfectly pure water, in the absence of air, has no action on metallic lead; if, however, lead be immersed in rain water or in ordinary distilled water there is almost immediate action, and if, after the lapse of a few minutes, the liquid be agitated, there will be seen an abundance of white scales of the hydrated oxy-carbonate of lead. This violent action seems to be due, in considerable measure, to salts of nitrous acid, especially nitrite of ammonium, always present in such water, and to be effected by the formation

some nitrous compound of lead which is more soluble in water than the oxy-carbonate, into which it is almost immediately converted by the carbonic acid of the air or by that which is dissolved in the water. In all waters also, hard and soft, there appears to be formed at first an oxide, (or hydrate,) and this also is more soluble than the oxy-carbonate; if lead be partially submerged in water, there will always be found on it, after some days, at the surface of the liquid, yellowish white crystals of hydrate of lead, along with the crystals of the oxy-carbonate. The bluish gray coating which forms on the surface of lead exposed to a moist atmosphere is a practically insoluble suboxide.

It may be asserted that in all natural waters lead suffers corrosion to a greater or less extent. All the conditions upon which this action depends are not accurately known, so that we cannot say *a priori* whether a given water will act slightly or violently on the metal with which it may come in contact; moreover, there is considerable diversity of opinion as to the effect, in this regard, of the presence of various individual salts; still, it seems to be very generally agreed that the influence of sulphates, phosphates and carbonates is protective, not only because the presence of these salts lessens the power of the water to dissolve oxygen and carbonic acid from the air, but also on account of the formation of a coating of lead compounds, which coating is but very slightly soluble itself, and at the same time prevents the direct contact of the water and the metal.

In regard to the solubility of the various salts of lead: one part of the sulphate requires 20,000 parts of cold water for its solution (Fresenius); the carbonate requires 50,000 parts of water (Fresenius); the oxy-carbonate is but very slightly soluble (Yorke), while the phosphate is altogether insoluble (Mitscherlich, Fresenius). The solubility of the carbonate and oxy-carbonate is so slight, that it is ordinarily stated that water contaminated with lead from lead-pipes or tanks may be rendered harmless by standing for a certain length of time exposed to the carbonic acid of the air, and Faraday proposed (Rep. Chim. App., I., 498,) the addition of powdered chalk to water collected from a lead-covered roof, asserting that the lead was thus entirely precipitated and the water made potable. With regard to the other salts of lead, the suboxide is absolutely insoluble (Horsford and others), the hydrated oxide is soluble in 7,000 (Bonsdorff) or 10,000 to 12,000 (Yorke) parts of water, while the chloride and nitrate are much more soluble, the chloride dissolving in 135 parts of cold water (at 12.5°C., Bischof), and the nitrate in about three parts of water at the ordinary temperature.

The greatest amount of protection seems to be afforded by the presence of carbonate of lime held dissolved by an excess of carbonic acid, a coating of carbonates of lime and lead being formed in such case; yet some observers assert that a large excess of carbonic acid exercises a solvent action on carbonate of lead (see Miller's Inorganic Chemistry, under Lead). Other observers deny this fact (see Noad.—Chem. Soc. Jour. IV., 1852, pp. 20–26). The influence of nitrates and chlorides is felt to be pernicious; organic matters, which under certain circumstances cause corrosion of the metal, as they contribute to the formation of a difficultly penetrable coating, are to be classed with the protective agents.

In the distribution of water through lead-pipes, there are other circumstances which exert more or less influence on the action of the water on these pipes. The corrosion is recognized to be more considerable where the pipe has been sharply bent, where other metals, as in the case of solder-joints and stop-cocks of metal or alloy, come in contact with the lead, and where the water is transmitted through the pipes at an elevated temperature. In regard to the action of iron-rust coming from the mains, authorities differ; Horsford distinctly states (Proc. Am. Acad., II., 64,) that hydrated peroxide of iron in water is not reduced by lead, and consequently that we "may infer the freedom from corrosion of leaden pipes connected with iron mains, as far as the reduction of the pulverulent peroxide of iron may influence it;" Hayes, on the other hand, asserts that the ochreous deposit from the iron mains *assists in the corrosion*. It is a question whether there may not be a certain galvanic action between the iron-rust and the lead, or even between the coating of lead compounds and the lead itself; it is, moreover, well-known that if a bit of mortar or plastering falls into a lead-lined tank, or is carried into a lead-pipe, there is rapid corrosion in its immediate vicinity,—so that the influence of carbonates may not be altogether for good.

When the introduction of Cochituate water into Boston was under discussion, Professor Horsford of Cambridge made a series of experiments with regard to the action of the Cochituate, as well as of other waters, upon lead (see Boston City Documents, 1848, Nos. 18 and 32; also Proc. Amer. Acad., II., p. 64). He concluded that lead pipes could be used with safety for its transmission, and that the coating formed would be to such an extent insoluble and impenetrable, that after a certain time the action of the water would be practically nothing. These experiments in the laboratory have a certain value, yet too much importance must not be given them, performed, as they are, with small quantities of water

with a limited amount of metallic surface, and with the relative amounts of the two so different from those that are brought together in actual practice. Indeed, experience has shown that some waters, which in the laboratory seemed to corrode lead but slightly, really act very violently on the pipes through which they are conveyed.

With regard to the action of the Cochituate water on lead, we should infer from the small quantity of chlorides and nitrates, and from the proportionally large quantity of carbonates,* that this action would not be very considerable, and we are now in a position to determine from the actual experience of so many years how much it really amounts to. I have tested many samples taken from the pipes under various conditions, and have never failed to find indications of the presence of lead. The following *quantitative* determinations were made:—

No. 1.—Water dipped from the upper part of Cochituate Lake in a glass jar, August 31st, 1870.—1,000 c. c. of this water failed to give indications of the presence of lead.

No. 2.—Water from one of the drinking-fountains on Boston Common, July 20th.—100,000 parts of this water contained 0.0415 parts metallic lead, equivalent to 0.0242 grains to the U. S. gallon of 231 cubic inches.

No. 3.—Water from private residence, No. 137 Walnut Avenue, July 19th.—The water is delivered through a hundred feet or more of tin-lined pipe, and then through 10 or 12 feet of lead pipe. The pipes have been in

* Professor Silliman's analysis of the water was as follows: No. I. being from the part of the lake from which the aqueduct starts; No. II. from the other, the upper, end of the lake.

	I.	II.
Chloride of Sodium, . . . . .	.0323	.2540
Chloride of Potassium, . . . . .	.0380	—
Chloride of Calcium, . . . . .	.0308	—
Chloride of Magnesium, . . . . .	.0764	—
Sulphate of Magnesia, . . . . .	.1020	—
Sulphate of Soda,	—	.0843
Sulphate of Alumina,	—	.0146
Alumina, . . . . .	.0600	—
Sulphate of Lime and Silica,	—	.5700
Phosphate of Alumina,	—	.1700
Carbonate of Magnesia, . . . . .	.0630	.2560
Carbonate of Lime, . . . . .	.2380	.3860
Silica, . . . . .	.0300	—
Carbonate of Soda, equivalent to nitrates and crenates, and loss, . . . . .	.5295	.4757
	<hr/> 1.2200	<hr/> 2.2106
Carbonic Acid, average cubic inches to gallon,	10.719	4.549

(See Water Commissioners' Report, Boston, 1845.)

I find that the water as drawn from the pipes in the laboratory of the Institute contains 0.317 grains of chlorine to the United States gallon, and a mere trace of nitrates.

use some six months.—100,000 parts of the water contained 0.0342 parts metallic lead equivalent to 0.0290 grains to the gallon.

No 4.—Water from hot water pipes of same dwelling-house as No. 3, July 21st. This water passes through 40 additional feet of lead pipe, through a lead-lined tank and through an ordinary copper boiler.—100,000 parts of this water gave 0.191 parts metallic lead, equivalent to 0.112 grains to the gallon.

No. 5.—Water from the Chemical Laboratory of the Massachusetts Institute of Technology, drawn June 25th, early in the morning, after standing some 14 hours in the lead pipe which is about 150 feet long and has been in use several years.—100,000 parts of this water contained 0.098 parts metallic lead, equivalent to 0.057 grains to the gallon.

No. 6.—Water from the same pipes as No. 5, after running out enough to clear the pipes.—100,000 parts of this water gave 0.0307 parts metallic lead, equivalent to 0.0179 grains to the gallon.

No. 7.—Water from private residence, No. 8 Sawyer Street, Sept. 20th. The water had been let into the pipes only four days previously, and, at the time the sample was taken, had remained in the pipes for three or four hours. The pipe (lead) is some fifty feet in length.—100,000 parts of this water gave 0.073 parts metallic lead, equivalent to 0.0427 grains to the gallon.

No. 8.—Water from private residence, Kendall Street, Sept. 26th. This water was let into the pipes some four months since, and none had ever been drawn previous to this time.—100,000 parts of this water gave 0.0937 parts metallic lead, equivalent to 0.0547 grains to the gallon.

I would also record the following determinations.*

No. 9.—MYSTIC WATER from private residence, No. 12 Adams Street, Charlestown, 7½ o'clock A. M., Sept. 6th. There are about 50 feet of lead pipe which have been in use for 2½ or 3 years. Very little water had been drawn since July 1st.—100,000 parts of the water gave 0.120 parts metallic lead, equivalent to 0.0695 grains to the gallon.

No. 10.—MYSTIC WATER from Kidder's Chemical Works, Charlestown. Drawn 7 A. M. Sept. 6th, after remaining 13 or 14 hours in the pipes. Considerable quantities of water are used, and the pipe, 200 feet in length, has been in use four or five months.—100,000 parts of this water gave 0.120 parts metallic lead, equivalent to 0.0695 grains to the gallon.

* In all cases the lead was weighed as sulphate. Two liters of the water were evaporated to fifty c. c., with previous addition of nitric acid, and filtered. The incinerated filter was treated with nitric acid, the excess of acid driven off, the residue taken up with water and the solution filtered through a minute filter into the mass of liquid to be tested. Sulphuretted hydrogen was now passed through the liquid which was allowed to be only slightly acid, the precipitated sulphide of lead was collected on a filter, moistened with nitric acid, treated with a drop of dilute sulphuric acid and subsequently ignited cautiously with the filter. To avoid error from reduction to metallic lead, a second treatment with nitric acid and dilute sulphuric acid took place, followed by ignition with proper precautions.

In view of the foregoing quantitative determinations (Nos. 1 to 8) and of a number of qualitative tests, from conversation with men of experience engaged in the plumbing business, and from personal examination of various samples of lead pipes which have been in actual service, I feel justified in asserting:—

(1.) That Cochituate water which has passed through lead pipes is never absolutely free from lead.

(2.) That when the water is first introduced into the pipes, there is more action on the pipes, as far as contamination of the water is concerned, than subsequently, but that after a few days' service the quantity of lead in the water is practically very small.

(3.) That there is always more lead in the water after it has stood for some hours in the pipes than when it is allowed to flow freely.

(4.) That when the water passes through a lead-lined tank it will be likely to contain in solution or suspension a more considerable quantity of lead salts, from the fact that the lead is corroded more rapidly on the sides of the tank at the surface of the water. Moreover, in such tanks there is generally a considerable extent of surface of contact between solder and the lead.

(5.) That in the introduction of water into the pipes, the first effect is the tarnishing of the brightness of the lead due to the formation of oxide or suboxide; that there begins to form, almost immediately, a coating consisting on the *outside* of a brown and, at first, rather loose deposit (the color of which is not due to iron-rust as is ordinarily supposed, but to organic matter), and *underneath* of a white deposit composed mainly of carbonate of lead; that this coating increases with time in firmness and also in thickness, but that the rate of increase is so slow that practically the pipes used for conveying *cold* water, do not wear out and become unserviceable except from some accidental circumstance, as the freezing of the water, or, as is often the case where the pipes are laid underground, from corrosion from the outside or from a cause immediately to be mentioned. That, however, the pipes even under ordinary conditions would eventually wear out, I have no doubt, as there seems to be no limit to the action. I have indeed a specimen of a pipe which, being in contact with cold water only, for a period of fifteen years, was so corroded in the vicinity of a solder-joint as to be eaten through, and along the pipe there is a thick coating consisting almost entirely of carbonate of lead (with organic matter, a little carbonate and sulphate of lime and a trace of oxide of iron) which has penetrated the pipe in some places to the depth of 1-15 of an inch and more. There is one other circumstance contribut-

ing to the wear of cold-water pipes which is not to be overlooked. The water is delivered in many cases under such a pressure that the pipes tend continually to expand. The effect of this is often to strain the pipes so as to form longitudinal seams or grooves of greater or less length and the corrosion taking place under such favoring circumstances more rapidly, sometimes extends through the pipe, which is thus rendered unserviceable by a combination of chemical and mechanical action.

(6.) That pipes used to convey *hot* water are corroded more or less rapidly, a deposit similar to that in the cold-water pipes being formed, and the corrosion manifesting itself most decidedly in the vicinity of the solder points, and where the pipe is sharply bent. Whether the iron-rust, coming from the *water-backs* in which the water is heated, contributes to produce this effect, I am not prepared to say. The disarrangement of the particles of the lead and the change in its mechanical structure, brought about by the alternate and unequal contractions and expansions to which it is subjected, must present more favorable opportunity for the corrosive action due simply to the passage of the water through the pipes.

In connection with this report, I would present a list of the "literature of the subject," which, although not pretending to completeness, may be of service to any one interested in the matter.

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Lambe.—Researches into the Properties of Spring Water. 1803.

Guyton-Morveau.—Ann. de Chim. LXXI. (1809), p. 197.

Scudamore.—Analysis of Water of Tunbridge Wells. 1816.

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Report of Water Commissioners on the Material best adapted for the Distribution Water-Pipes. City Document No. 32. Boston, 1848, containing Prof. Horsford's Reports.

Horsford.—Boston City Documents 1848, Nos 18 and 32; Proc. Amer. Acad. II, p. 64; Chem. Gaz. VII., pp. 295-298.

Hayes.—Boston City Document No. 18, 1848.

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Jackson.—Essay on Lead Pipes used as Conduits for drinking-water, contrasted with pure block-tin pipes. New York, 1852.

Buckler.—Amer. Jour. Sci. (2) XIV., (1852) p. 267.

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Respectfully submitted,

(Signed)

WM. RIPLEY NICHOLS.

MASS. INSTITUTE OF TECHNOLOGY, }
 BOSTON, Oct. 20, 1870.

From the evidence presented in the preceding pages, it seems reasonable to believe that the use of lead pipe for the conveyance of drinking water is always attended with a certain degree of danger, because such water always contains lead; and that this danger varies in degree with the character of the water conveyed and the susceptibility to lead poison of those who drink it.

The chemist can say that water containing air (or natural water) always acts upon lead; but he cannot say that a certain kind of water will, under all circumstances, take up and convey

in solution, only a certain proportion of lead. The physician finds it equally impossible to say that a certain proportion of lead in water will hurt no one.

From these two shifting elements of difficulty come all the doubt and obscurity which have made the influence of lead-pipe-water a disputed question.

How much lead can we habitually take without injury? No one would voluntarily add it in ever so small amount to the water of the spring, well, or lake which supplies his drink, yet thousands and even hundreds of thousands of people in Massachusetts do constantly receive it in very minute amounts without manifest injury.

No well authenticated instance of lead poisoning from the Boston water has come to our knowledge, although lead pipe is almost universally used for its distribution. The same statement may be made as regards Charlestown and Worcester, and is doubtless true of other large cities and towns supplied by water works from lakes of great purity. We may conclude from experience and observation that the character of the water in these cities is such as to dissolve lead in so small amounts as to be generally harmless,—and we use the word “generally” advisedly, because although paralysis, and wrist-drop, and the most distinctive signs of saturation with lead have not been observed, it does not therefore follow that minor obscure ailments, particularly of the nervous system, have not been aggravated or even caused by this subtle poison. There are a great many cases of neuralgia, of (so-called) rheumatism, and of dyspepsia, whose causes are unknown.

When we see that Professor Nichols finds one-ninth of a grain of lead to the United States gallon (equal to one-eighth of a grain English gallon), in the hot-water pipes of a private house in Boston, and remember the possibility of such water being habitually used for cooking purposes, it is well to be cautious in giving it a good character under all circumstances.*

But if the lake water of the cities mentioned, is generally incapable of dissolving a dangerous proportion of lead, it is

* A case of lead poisoning recently occurred in the city of New York, which was traced to the use of Croton water (whose character has been thought safe), drawn from the hot-water pipes after standing in them all night. In this water “cracked wheat” was soaked every morning, preparatory to boiling.

equally certain that the water of springs and of wells is very often ready to dissolve an amount which will produce dangerous disease.

The chemical evidence already presented shows that it is so difficult as to be practically impossible to say, even when we know the constituents of the water, whether it will dissolve dangerous amounts of lead until it has been actually tried by domestic use and for considerable periods of time.

It is well that we should have some idea of what have been found to be dangerous amounts of lead for habitual use.

Dr. Angus Smith says that one-fortieth of a grain per gallon will affect some persons, while one-tenth of a grain may be required for others. Dr. Parkes, a high English authority, thinks that any quantity exceeding one-twentieth of a grain per gallon must be regarded as unsafe. These opinions are also held by Professor Graham, Dr. Taylor and other equally known chemists and physicians. Dr. Adams, of Waltham, reports a case of poisoning in which only one-hundredth of a grain per gallon was found in the water. In the celebrated case of the poisoning of the family of Louis Philippe by drinking water which had been stored in a lead tank, the amount of lead was seven-tenths of a grain per gallon. This quantity affected thirty-four per cent. of those who drank it.

The susceptibility of individuals to the action of poisons, whether metallic or non-metallic, is known to differ exceedingly. Many persons pass half their lives in ignorance of their own peculiarity in this respect, and then have revealed to them by some lucky accident that what to their neighbors has been harmless, has been to them for a long term of years the source of great discomfort or illness. In our reports from the towns it is evident that in numerous cases water containing lead in solution has been insidiously undermining the strength of people who never suspected the cause until some one of their family, still more susceptible to this peculiar poison, developed the signs of advanced lead disease. The minor degrees of illness from minute doses of lead must have been unrecognized in a great number of cases where no physician was consulted, and where, even if he had been, he might readily have failed to trace them to the use of water conveyed very likely in the

same way as that which he had himself used without any visible harm.

(The only safe practice with water which has not been tested with lead pipe by long experience, is to use some other material than lead for its conveyance.

The only reason (and it is an excellent one as far as it goes), why lead pipe is so generally used for the distribution of water, is that it is cheap and convenient. Many substitutes have been proposed. ✓ Iron naturally suggests itself first, and, on the score of health, is quite free from objection, as minute doses of iron rust are harmless. One difficulty with iron is found in adapting it to the circuitous passages which domestic convenience requires it to traverse in our houses; another is found in the obstruction of the pipes by rusting. For conducting water from a spring in a direct line to the dwelling, it may be regarded, in spite of this latter objection, as practicable, cheap and safe. ✓ It has been said that the iron rust might render it unfit for washing white clothes, but this objection seems rather fanciful than real, as in all city houses supplied with hot water it is carried through an iron water-back behind the range, besides passing through miles of iron mains, without discoloration.

For use in wells or for conducting water from springs, tubes of wood have been proved by long experience to be generally good and wholesome. It has been thought that water containing sulphate of lime sometimes acquired a flavor of sulphuretted hydrogen from its passage through decaying wood. It is certainly a perishable material, but so is lead, and the latter by dangerous corrosion. We are inclined to believe that, generally, wood will last longer than lead.

To obviate the inconvenience and obstruction caused by rusting, the (so-called) "galvanized iron" is often used. This is prepared by passing iron pipes, cleaned by dilute acid, through a bath of molten zinc.* It is claimed that the whole character of the metal is thus changed, and the zinc does actually seem to soak in, in certain cases. But the quality of

* It has been said that zinc (as well as lead) may impart a poisonous quality to water conducted through it. This is not proved, nor is it very probable. The question is discussed by Dr. Winsor, of Winchester, in the Boston Med. and Surg. Journal, Jan. 5, 1871, and the conclusion reached that although carbonate of zinc may be found in water conveyed through galvanized iron pipes it is no more harmful than carbonate of iron.

the product varies, so that often the coating of zinc is only superficial, and sometimes the interior of the pipe is not completely covered. There can be no doubt that this zinc covering preserves the iron from rusting for a certain time, varying with the quality of the pipe.*

✓ Gutta-percha pipes are sometimes used in wells and would seem to be excellent for this purpose, but it is questionable whether they will bear the pressure of the water-works of Boston.

✓ Pure block-tin pipes are excellent on the score of health, as the oxide of tin is insoluble, but they are rather expensive for general use.†

✓ Quite recently much use has been made of lead pipe lined with tin. This material is sufficiently flexible to be carried anywhere, and is not expensive. It has been longer used in England than in this country, and is there highly commended and on good authority. Nevertheless, it would seem difficult, if not impossible, to entirely prevent in this way contact between lead and water, and when it does take place, the corrosive action would be rather hastened by the presence of the other metal. Time alone can prove the value of lead lined with tin, and it is yet new.‡

The same may be said of the seamless brass tubing now being introduced, to save the expense of repairs, in a good many places. For drinking water it must be looked upon with suspicion.

Glass tubes, and iron lined with glass have sometimes been used, and seem to answer every condition required by health; but, as in so many other things, health, convenience and economy cannot in this way be combined.

* See Mallet, in report of British Association for 1840.

† Block-tin pipes are rapidly corroded underground, and should be protected in some way from the action of the soil when used under such circumstances.

‡ Since the above was written we hear on good authority of some tin-lined lead pipe being removed after being in use two years at Roxbury Highlands, and found perfectly uninjured and even bright on its internal surface.

TRICHINA DISEASE IN MASSACHUSETTS.

TRICHINA DISEASE IN MASSACHUSETTS.

There have been two recognized outbreaks of this preventable disease in 1870 ; one in Saxonville, and the other in Lowell.

The discovery of this strange and terrible cause of sickness and death is an excellent illustration of the progress of science, of the use of the microscope, and of exact and careful observation. Here is a disease which we have every reason to believe has existed among men as long as they have eaten pork, which has killed or made sick thousands upon thousands of people, and yet whose nature and whose cause no man suspected until within a very few years. The first glimmer of light concerning it was perceived in 1832, but since 1860 it stands clearly revealed through the labors of physicians and microscopists all over the world, so that to day it is one of the diseases most completely understood. Its history, its causes as occurring in man, and the means of avoiding it are now plain and intelligible. Trichinous pork is the flesh of a pig containing, imbedded in its substance, very minute living worms of a peculiar kind, invisible to the naked eye, each coiled up in a snug little oval capsule. The pig having this parasite in its muscles may be, and often is at the time of killing in apparent health. He may have been well cared for, and there may be absolutely nothing in his condition or in his surroundings to excite the least suspicion. This was true of the Tewksbury pig which caused such suffering to the family at Lowell in the present year. Yet whoever eats the smallest morsel of the lean meat of the animal without first killing the parasite, becomes surely affected with one of the most painful and terrible, although fortunately not one of the most fatal of diseases.

The parasites on being swallowed by man are quickly freed from their capsular envelope, multiply with immense rapidity,

and in three or four days the intestine swarms with the young trichinæ or flesh worms. They then set out on their travels, piercing the walls of the intestine, and boring their way through all intervening tissues, they proceed to establish themselves in the muscles (the red flesh) of the whole body. No muscles, except those of involuntary motion, escape their presence.

It is as if myriads of needles were being thrust through the flesh of the unhappy subject. The great muscles of the extremities and of the trunk of the body, the little muscles concerned in turning the eye, all, big and little, are invaded by these worms. The whole body is alive with them. Their number is so great that a minute fragment of flesh placed under the microscope reveals scores of them pushing their way through the muscular fibres.

Finally, in the course of about four weeks if the patient survives the suffering and the disturbance of vital functions, the worms all find the home they have sought, the promised land of the red voluntary muscle, and there they coil themselves up, become encysted or encapsuled, as originally found in the flesh of the pig, are dormant, comparatively harmless, and in the course of years die, and are changed into a chalky material which remains ever after in the muscle, weakening its structure somewhat, but apparently doing no great subsequent harm. In this condition they are not very infrequently observed in the bodies of those who have died from other diseases.

The writer has now in his possession a piece of dried flesh taken from a dissecting-room subject many years ago, and which has the appearance of being finely dusted with a grayish powder. On microscopic examination each of these minute points is seen to be a trichinous capsule converted into a cretaceous material.

The symptoms of trichina disease ordinarily observed are as follows:—

1st.—Feverishness, loss of appetite and of strength. Sudden swelling of the face, particularly about the eyelids, but without pain; copious perspirations.

2d.—Swelling of the muscles all over the body; every movement is now attended with severe pain; the muscles are also sensitive when touched.

3d.—Contraction of the flexor muscles of the legs, arms, and trunk, so that the patient lies drawn up, and upon his side;

swelling of a dropsical character, affecting the feet, legs, thighs and trunk. This order of signs marks the disease, and occurs in no other. There is usually diarrhœa, but not always. The prostration and febrile action bear a certain resemblance to typhoid fever, with which trichina disease has no doubt been confounded in previous generations before the flesh worm was seen.

The cases occurring in Massachusetts during the past year were under the care of Dr. G. S. Eddy of Saxonville, and Dr. Joel Spalding of Lowell, and we are indebted to these gentlemen for the following details. The Lowell cases were also seen by the writer on the 9th of April.

A family in Saxonville consisting of six persons partook of a dinner of fried fresh pork on the 8th of February, 1870. It was the only fresh pork used in the family during three months, with one exception. A portion of the meat was underdone, and the member of the family who ate the red and imperfectly cooked pork suffered most. Three escaped entirely, and three were affected on or about the 15th of February with the following symptoms.

Very marked lameness, soreness and stiffness of the voluntary muscles, more especially those of the calf of the leg. This muscular pain was the first sign in all these cases, and the most distinctive sign throughout. All three, however, had swelling of the face and of the feet.

The youngest, a boy of fourteen, after an illness of four weeks, during a portion of which period he had diarrhœa, entirely recovered.

His sister, two years older, was more seriously affected. For ten weeks she was confined to her bed, most of the time unable to lift hand or foot, and the lightest touch causing excessive pain. During this time there was no diarrhœa, and no marked increase of temperature, but an extremely rapid and weak pulse. Appetite voracious. No gastric disturbance. On the 16th of May she was just able to move about the house with muscles impaired, but daily improving.

The case of the eldest, a young man of 19, assumed about the third week, the general appearance of typhoid fever. Extreme depression, abdominal tenderness, diarrhœa, bleeding from the nose, pulse 150, finally, coma and death on the 12th of March.

Portions of muscle taken after death from the arm, thigh and calf of the leg proved to be swarming with living trichinæ.

No portion of the pork could be obtained for examination, nor could any history of the pig be got from the butcher who sold it. He was somewhat incensed by the subsequent small demand for fresh pork in the neighborhood, and declined giving any information.

The trichina disease was communicated to a family in Lowell in February and March, 1870, through a smoked ham from a pig raised by a Tewksbury farmer. It was one of an apparently reputable litter, had been well kept, and exhibited no sign of disease during its life. The ham and some of the salted mid-dlings from this pig were delivered to the family in Lowell on or about January 20th.

The family consisted of father, mother and six children.

The two youngest children ate none of it. The father ate some of it slightly cooked, and the rest of the family ate it *raw*, cut in thin slices like smoked beef.

It seems to have been used as a sort of relish, eaten with bread, and portions of it remained in existence and were examined under the microscope as late as April 1st. The infection was thus received in small portions and at considerable intervals by different members of the family, except in the case of a girl of sixteen who had been absent and returned home on the 3d of March.

The first signs observed in all these cases except one, were those of an ordinary cold. Weakness, loss of appetite, shivering, and irritation about the air-passages.

The daughter declared that her first indication of illness was swelling about the eyes. In a few days muscular pains succeeded in all the cases.

Then stiffness and contraction of the muscles, swelling of the feet and of various parts of the body. In all there was great prostration of strength, and a rapid pulse. There was diarrhœa in three of the six cases.

On the 9th of April all were able to be on their feet except a boy of 11, who laid on his side with the body bent, arms and legs strongly flexed, complaining of great pain on being touched, with a rapid pulse and an expression of great suffering. He

was quite unable to extend his body or extremities, but had a voracious appetite, and subsequently recovered entirely.

The daughter of 16 had the complexion and facial expression of Bright's disease, and walked across the room stiffly, without being able to touch her heels to the ground, like a person under the influence of strychnia. She was improving daily.

The fragments of ham which were sought for by Dr. Spalding early in his attendance on these singular cases, and which fortunately remained, were found to be filled with living trichinæ.

The salt pork from the same pig was also crowded with them in perfect form and shape, each curled up in its little cyst, but probably killed by the pickle.

The *prevention* of this pork flesh-worm disease is entirely within our power, and depends upon the following well ascertained facts. Although the vitality of the trichina is maintained for years in the muscle of either man or pig, ready to become active and to reproduce its like on being transferred to the intestine of another animal, its life is completely destroyed by thorough cooking. A temperature of 150 to 160 degrees Fahrenheit is fatal to it.

Pickling may and probably does render the pork harmless.

Smoking (except at a very high temperature) certainly does not, as we see in the Lowell cases and many similar ones in different parts of the world. In some parts of Germany, where much uncooked pork is eaten in the form of sausages and ham, there are government inspectors to examine with the microscope portions of every pig offered for sale. This of course would be quite impracticable with us, and is indeed unnecessary anywhere if people will understand the all-important fact that uncooked pork muscle, that is to say the *lean* portion, (for trichinæ are not harbored in the fat) can never be eaten with safety. It should not only be cooked, but fresh pork, whether spare-rib or sausage, should be cooked so thoroughly that all redness has disappeared from it, and smoked pork should be boiled at least two or three hours. If a temperature of 160 degrees has reached the interior portions we may eat it without fear of trichina disease.

HEALTH OF TOWNS.

HEALTH OF TOWNS.

REPLIES OF CORRESPONDENTS TO INQUIRIES CONCERNING THE PROBABLE CAUSE OF SUCH DISEASES AS ARE SPECIALLY PREVALENT IN MASSACHUSETTS.

In our Circular of April 8, 1870, the following questions were asked :—

1st. Is there any disease, or are there any diseases which seem to be specially prevalent in your town, or in the region in which you practise ?

2d. If so, will you do us the favor to state what they are ?

3d. Can you account for this special prevalence, and is it, in your opinion, removable in any degree ?

These questions will be seen to cover an immense field. They were proposed in order that some general idea might be formed of the extent and value of the materials at our command, and in the belief that a comparison of the replies would furnish a guide for more direct inquiries in all parts of the State, as well as for the study of the causes of local disease in the various towns.

These expectations have been fulfilled. Although a very large majority of the answers received have been mere negations, there is a valuable remainder in which will be found facts of the greatest interest, and many speculations and suggestions founded upon daily observation, sometimes extending over a very long term of years.

Physicians, as a class, are not communicative. They neither talk nor write much. In the smaller towns they but rarely have opportunity of communicating freely with each other, and except in the occasional meetings of the District Medical Societies, or in consultation, each goes his own way. Even in the

larger towns and cities where physicians are numerous, although, as everywhere in the civilized world, the knowledge of each is the common property of the profession, there is but little talk upon the causes of disease.

But if physicians say little and print almost nothing on these obscure subjects, it is certain that they think a great deal. In the course of his long and weary rides about the country, the Doctor ponders and speculates upon the causes of what it is the business of his life to contend with.

Why does that particular farm-house have fever or dysentery among its occupants every year in a certain month?

How is it that three or four different families who have lived in a certain house within my recollection have become consumptive?

Why does a certain hill, or ledge, or swamp, or clay bottom prove fatal to three times as many of its inhabitants as another locality within a mile of it?

Do as many people die of consumption now as thirty years ago when I began practice?

How has the temperance reform affected public health?

What change has taken place in the health of the people in this town since they left off going to sea and took to shoe-making?

Such questions are suggested by daily experience, but have not often been answered in printed publications, or in any form through which other practitioners or the general public could use the knowledge thus gained for the general good of the community. Such information has for the most part been lost by the death of those who collected it.

The following extracts from letters received from physicians, chosen by the selectmen of towns in every part of the State, will show how deep is the interest which they feel in the study of the causes of disease; and we doubt not will give the medical profession still stronger claims than ever before to be regarded as the natural guardians of the public health.

The whole number of replies received to the Circular before referred to is one hundred and seventy-one. Of this number, one hundred and twenty say that no disease is specially prevalent in the town or region of their practice. Fifty-one designate

either a special disease or a class of diseases as specially prevalent, and they are thus divided :—

Respiratory organs,	20
Consumption,	15
Typhoid fever,	9
Disease of nervous system,	2
Croup and pneumonia,	1
Dysentery,	1
Functional diseases of uterus, caused by use of sewing machines,	1
Cerebro-spinal meningitis,	1
Rheumatism,	1

Acushnet.—Consumption and typhoid fever are the most prevalent diseases, and seem to be influenced by easterly and southerly winds blowing across the Cape, and by a great deal of swampy land and stagnant water.

Amesbury.—"Lung diseases prevalent. The town, or rather its most thickly settled portion, is located about seven miles from the seacoast. To the west and northwest hills rise, leaving the village in a hollow, through which flows Powow River. We have strong east and northeast winds. A large portion of the Irish live in tenement houses built along the bank of the river, and but little raised above the high-tide level. In some localities and houses I think I have been right in attributing the frequent throat and lung difficulties to dampness of the house or part of the house occupied by the family."

Attleborough.—"Consumption is of frequent occurrence, but perhaps not disproportionately to other diseases. In every case of consumption seen during fifteen years I have found that ancestors in the direct or collateral line have died from it. I have met with some marked instances of arrested phthisis where the physical signs indicated the first stage of the disease. These cases have seemed to testify to the correctness of Niemeyer's theory. The disease has, under my observation, occurred in several instances twice or three times in the same house. In one case, where three persons have died within five years, the house, though large, open and well-exposed to air and light, is on a ridge between two swamps, neither of which is more than two or three hundred feet distant. I have

also learned that before my acquaintance, one or more cases of consumption occurred in the same house. In another place where there have been three deaths from this disease within my knowledge and another previously, the house is surrounded on three sides by low lands and on the east there is a high hill. The town is well elevated, but there is much undrained land and prevalent surface water."

Ashland.—Occupation of the inhabitants, boot-making, chiefly; the usual number of mechanics of other classes and a few farmers. The main village, on a level plain at the confluence of two streams and surrounded by hills. The soil is a sandy loam, with a yellow subsoil resting on a bed of gravel. The whole plain is full of water in the spring, but the natural drainage is excellent. From the lowness of this plain a stranger would suppose that Ashland must be an unhealthy town, but our correspondent thinks it above the average in respect of health. (For further remarks concerning the diseases prevalent here at certain times and places, see under the head of typhoid fever.)

Athol.—Air of lower village affected injuriously by stagnant water.

Brimfield.—"Pigsties and privies are the chief abominations of country dwellings, and will, in my opinion, continue to be a great cause of disease until the people are educated on this point. If they were properly attended to, there would be less sickness. I have in several instances directed the removal of piggeries which had been built close up to the dwelling."

Boston.—Our reply to the question concerning diseases specially prevalent may be found in another part of the present volume, under the head of "Analysis of the Mortality of the City of Boston." This information applies to the year 1870 alone. For a series of years the answer in general terms would be that the diseases most prevalent are those of infancy, and that they are dependent chiefly upon the impurity of air and of food.

Boston is blessed with an abundant supply of pure* water for rich and poor, and for this we cannot be too thankful. Vaccination has also been, for many years past, provided gratuitously for all who would avail themselves of it, and this, combined with the rule

* The qualifying statement should be added that lead, in minute amounts, is always found in the water when lead pipe is used for its conveyance.

that all children before entering the public schools shall produce evidence of vaccination, has kept small-pox under control. An inspection of milk is made by public authority, and with the best results. Public bathing-houses during the summer months have been established, and have proved of great value. All these are important provisions for public health, but they are only exceptions to the general rule of indifference to the general subject.

Boston has grown to be a great and crowded city, needing to avail itself of all the aid which modern science can furnish to prevent the origin and spread of disease, while its (so-called) health department is almost exclusively occupied in the direction of the city stables, and of the men and horses and carts connected with those establishments, and is seemingly without a care beyond the routine of scavenging, which is conducted on the same plan as when Boston was a town. When nuisances have grown to be unbearable by those exposed to their influence, and after repeated "complaints" have been made, an effort is made to suppress them; but there is no spirit of prevention, or of anticipation, and no sign of an intelligent appreciation of the consequences of sanitary neglect.

The legislature has provided laws framed to meet all our needs but they are not executed.

The deficiencies of the public service in these respects are set forth in the following document, which was presented to the Board of Aldermen in April, 1870, by the physicians who then accepted what they regarded as the responsible office of "Consulting Physicians of the City of Boston."

CITY OF BOSTON.

To the MAYOR AND ALDERMEN, *Health Commissioners of the City of Boston.*

The undersigned have recently received the honor of appointment as Consulting Physicians of the City of Boston.

Being desirous to understand at the outset the exact nature of our duties, application was made to the City Solicitor.

From that officer we learn that we are required to watch over the public health, and give timely warning of danger from any form of preventable disease, and that, failing to do this, we should not comply with the intention of the ordinance requiring our services.

This grave responsibility we accept, and in accordance with its obligations beg leave respectfully to make the following statements.

The death-rate of Boston has been for some years past so high as to excite the attention of the medical profession.

With natural advantages for drainage and ventilation equalled by very few cities in the world, and with an abundant supply of pure water, there is still

an average annual mortality of between twenty-four and twenty-five to the thousand of population.

During the past ten years the chance of living has been not quite as good in our City of Boston, almost surrounded by the sea, with a population of 200,000, as in London, on the Thames, with a population of 3,000,000.

The greater vital depression caused by want and misery in that most vast of modern cities seems to have been more than counteracted by the careful protection of public health.

Comparing the mortality of Boston with that of other parts of the State, the indications are also very unfavorable.

Half of the people of Massachusetts live in districts where the annual mortality does not exceed seventeen or eighteen to the thousand.

In 1868, the last year of which the records are published, four hundred and eighty-seven deaths from cholera infantum occurred in Suffolk county, while in an equal population outside of city limits the number was less than one hundred. The mortality from all bowel diseases of children is in similar proportion in Boston and in the country.

There are causes for this excessive mortality, and it is our duty to try to discover what they are, and if possible to point the way for their removal.

Among the first requirements for public health in a crowded city are sewerage and pavement,—such sewers as will cause all the foul liquids to flow away by force of gravity, and such pavement as will prevent all soakage into the soil.

To obtain these in perfection is a work of time, of great cost, and of the highest engineering skill; we cannot hope to have them changed except by slow degrees, and by such processes as have for many years been going on in Boston with public approval.

But there are other means of protecting public health easily reached, and whose benefits might be at once enjoyed by the citizens, to which we would invite your attention, as we deem them to be of great importance.

Our streets are not clean. It is perhaps unfortunate for sanitary progress in Boston that comparison in this respect with New York is so readily made. We return from that city congratulating ourselves on the superior cleanliness of Boston streets, which no one can question, but sometimes forgetting that the standard of comparison is a very low one.

The Metropolitan Board of Health of the city of New York have already accomplished a sanitary work from which other great cities may learn many useful lessons.

They have reformed the tenement-houses, suppressed dangerous epidemics, cleaned and disinfected the vaults, and removed or regulated all offensive trades; but the streets have been always entirely beyond their control, and the Board of Health are not in the least degree responsible for their condition. Street-cleaning in New York is a corporation job.

There can be no doubt that, in so far as the streets are concerned, New York is the most filthy great city in the civilized world. Our standard of comparison should be the streets of the great cities of Europe, which are as

much cleaner than the streets of Boston, as ours are cleaner than those of New York,

The dirt of the streets of Boston is made up, in great part, of the excrement of horses. This is allowed to accumulate, being alternately dried by the sun and air and soaked by the rains and watering carts, until it forms a foul and dangerous compost, tending directly, through the air with which it is in contact, to the production of disease. The interests of public health require that it be removed with much greater frequency than is now practised. We are of opinion that, during the summer and early autumn, every street in the city should be cleaned once in twenty-four hours, and the great thoroughfares by night.

There are, in all parts of Boston, filthy back-yards, alleys and passageways, broken-down and overflowing vaults, and, in the older portions, disused wells and cisterns, which are receptacles for dirt. All these nuisances should be reformed.

Offensive trades, like fat-melting and bone-boiling, are carried on in open vats in the midst of a crowded population. They should be compelled to use methods, tried and approved in New York, by which the sickening vapors may be entirely consumed. The authority to control these trades is given by statute.

House-offal, or swill, is allowed to become putrid before removal from the houses of the citizens. The offal is a source of profit, being kept by special ordinance free from mixture with ashes, which would tend to prevent its becoming offensive; but this enforced division of refuse material makes it the more obligatory upon the city authorities to take the dangerous portion away before it undergoes decomposition.

In our opinion public health requires that house-offal should be removed, in summer and early autumn, every day from every house.

Our tenement-houses are in a condition discreditable to a civilized community. It is only necessary to visit Friend Street Court, or the "Crystal Palace," in Lincoln Street, for any citizen to see under what desperate circumstances the occupants of these and hundreds of other similar houses are compelled to live. Their rents are enormous, and their condition calls for the relief which the legislature of 1868 intended to afford them through the Tenement-House Law.

This law has been a dead letter, but the interests of public health require that it be enforced without delay.

It is now no one's duty to inspect the fresh provisions offered for sale in Boston, while the law provides for the destruction of all which are unsound, and of all meat of any calf killed when less than four weeks old. We believe that public health requires the enforcement of these laws, and we would respectfully suggest that a systematic inspection of meats, fish, vegetables and fruits be made by city authority in a manner similar to the inspection of milk, which has proved to be so useful.

We think that all the reforms to which we have referred are practicable.

They concern every citizen, whether he may chance to live in a good home, with apparently wholesome surroundings, or in the most wretched ten-

ement-house; for no one can escape the general influence of the sanitary condition of the city in which he dwells.

These reforms would require an outlay of money, but we believe they would prove to be good investments, and that a true economy demands them.

The money value of human life to a community is real. A destructive epidemic is expensive. Moreover, a clean and unquestionably healthy city, such as Boston might be made, would have attractions for permanent residents and transient visitors which could not fail to favorably affect its commercial interests.

It might also well be an object of pride with every citizen to furnish in Boston an example of public cleanliness and public health which other American cities would imitate.

Very respectfully, your obedient servants,

HENRY BARTLETT,
GEORGE DERBY,
JAMES C. WHITE,
WILLIAM READ,
P. P. INGALLS,

Consulting Physicians of the City of Boston.

Boston, April 14, 1870.

As the season approached when cholera infantum and the bowel diseases of children were certain to commit great havoc in and around the filthy localities in which Boston abounds, the State Board of Health called the attention of the city authorities to their unwarrantable neglect of a law of the State in a letter which may be found in the general report of the Board.

These remonstrances have produced no visible effect. Instead of improvement there has rather been a progressive deterioration during the past year; a gradual lowering of the standard of municipal cleanliness, such as has been going on for many years through the growth of population, and the inertia of the health department fixed in its old traditions.

The streets are still very dirty, the alleys and passage-ways and back-yards often filthy, the vaults still broken and overflowing, the air of crowded neighborhoods made sickening by bone-boiling and fat-melting.

House-offal is still a nuisance in all parts of the city by being kept until putrid during the warm season.

Unsound provisions, both meat and vegetables, are freely sold, and, as it is nobody's business to enforce the law on this subject, it is a dead letter.

The tenement-houses of Boston, the houses in which the most impoverished and unhappy portion of our fellow-citizens are crowded

together, are a disgrace to our civilization. Through their squalor and wretchedness they foster crime as well as disease. Moral and physical health must equally suffer under their shadow.

The rent extorted from their unfortunate tenants, often through middle-men who have great rapacity and little feeling, is far larger in proportion to what they get in return than is paid by the prosperous. A single room, fifteen feet by ten, sunless and damp, unfurnished and entirely out of repair, brings \$1.25 to \$1.50 a week, or the interest of \$1,000. Two rooms, fairly above ground, but equally squalid in all other respects, bring double this sum. All such premises are at the present time crowded to overflowing at the above rates. Often twenty families may be found using the same privy, filthy and repulsive in condition. Nowhere in these houses can the slightest evidence be seen to-day of the existence of a law of the State passed in 1868 for their regulation, and whose execution is vested exclusively in the Board of Health of the city of Boston.

Lest the above statements concerning the dwellings of the very poor should be regarded as exaggerations, the following list is given of places visited by the Secretary of the State Board of Health in November and December, 1870, and which justify the description:—

NOTE.—Where numbers are not given, reference is intended to the general character of houses in the street or court.

Stone's Yard, 100 Cross Street.
105 and 107 Cross Street.
Young's Court, rear of 124 North Street.
Mechanic Court.
Blind Alley, rear 209 North Street.
Land's Court.
Rear of 324 North Street.
Stone's Alley, Stillman Street.
Cook's Court, rear 390 Commercial Street.
Holden Court, rear 398 Commercial Street.
Commercial Court.
Basements in Pond Street Place.
Institute Avenue.
Basement of No. 8 Morton Place.
Crystal Palace, Lincoln Street.
Utica Street.
Cove Place.
Shaving Street.
Rear of 147 Kneeland Street.
128 Kneeland Street.

Cove Street.
Rear 298 Federal Street, extending around to Shaving Street.
137 Beach Street.
Federal Place, rear of 235 Federal Street.
Belmont Barracks, Broad Street.
116 Broad Street.
Wharf Street.
Rear of 155 and 157 Federal Street.
Holden Place.
62 and 72 Joy Street.
Stanhope Place.
Rear of 42 and 44 Phillips Street.
Southac Place.
Wilberforce Place.
Lee Place.
Lindall Alley.
Adams Place.
Barton Street (57 and 59) and Short Napier Street.
Parts of Billerica and Nashua Streets.
28 and 30 Lancaster Street.
126 Merrimack Street.
Alley leading from 132 Merrimack Street.
Parts of South Margin Street.
Rear of 67 Pitts Street.
Rear of 71 and 75 Pitts Street.
Yard and privies of 91 Merrimack Street.
47 and 53 Portland Street.
Alden Court.
Doherty Court, East Boston.
Rear of 107 Everett Street.
Second Street, (S. Boston,) south side, from Athens Street to No. 49.
Green's Alley.
Dungarvin Block.
Boston Wharf.
Athens Street from Second to A.
Slate House, corner Third and B.
Dewarson's Block, Silver Street, corner of C.
Silver Street, between B and C.
Buckley's Block.
Old Colony Block.
Parts of Ontario Street.
Parts of Rochester Street.

In evidence of the want of prevision of nuisances, of the complete neglect of their formative stage, when they might be prevented, of the indifference which permits their establishment, or of the ignorance which fails to see in advance the results to which they must

certainly lead, we would call attention to a hotel or lodging-house of seventy rooms at 44 Portland Street, built in 1870. At least, half of the whole number of bed-rooms have no windows, and are on both sides of long passage-ways only four feet wide. The rooms are in dimensions about ten feet by eight, and are absolutely dark, so that you cannot see the opposite wall without lighting the gas, and have their only supply of air through the narrow passage-way into which the doors lead. All this, of course, is in direct violation of the Tenement-House Law of 1868.

Blackstone.—"The diseases most prevalent are those of the lungs and inflammations of the mucous membranes generally. The mortality among our foreign population is large, more particularly among children. Very much sickness can be traced to a want of proper sewerage and the neglect of cleanliness and ventilation."

Barnstable.—Pulmonary affections very common, accounted for, in part, by exposed position of the town, moist atmosphere, fogs, cold winds from the sea.

Billerica.—"Vaccination and re-vaccination have been grossly neglected in this town, and if smallpox were to break out to-day, not more than five per cent. of the inhabitants would be suitably protected by vaccination."

Barre.—Locality favored with great natural sanitary advantages. No disease more likely to prevail here in the future than smallpox, when once imported. People are very negligent about vaccination.

Brookline.—Our correspondent informs us that there are in Brookline three or four filthy localities occupied by foreigners, and where the houses are crowded with people who pay no regard to cleanliness; their slops and refuse are for the most part thrown upon the ground—their pigsties are offensive. In contrast with all this, we know that the greater portion of the people of Brookline enjoy all the comforts of life, and there is, perhaps, no town in the State where so large a number are in possession of all which may be supposed to promote health and long life—beautiful estates are to be found throughout its territory. Our correspondent finds, as between these two classes of inhabitants, quite as much sickness among the rich as among the poor—quite as large a proportion of illness among the Americans as among the Irish. He

writes as follows: "I have concluded, in considering the comparative amounts of sickness among those who have comfortable houses and those who live in crowded quarters, that the habit of living out of doors day and evening in the summer, which prevails among the latter class, acts as a preventive of disease.* The gross amount of deaths in the poorer class is not an indication of the comparative amount of sickness with that class, but only a proof that, owing to a want of good nursing and good care, a larger number of fatal cases occur than among the wealthier classes. With regard to our epidemics of scarlet fever, I have noticed that they are at times confined to the population in the poorer neighborhoods and at other times to the wealthier class, thus agreeing with the idea that the disease does not, as commonly expressed, 'come in the air,' but is conveyed by contagion. For instance, this autumn the inhabitants of Pearl Place and of Fairmount, two locations occupied by the laboring class, the one on the marsh, the other a mile away, high and well ventilated, both suffered with scarlet fever of a malignant type, and causing many deaths, while there were only one or two cases in other parts of the town." (See further remarks under the head of Typhoid.)

Berkley.—Bronchial diseases seem to be most prevalent. Their cause obscure. Soil rather low and wet, not very pervious to water. A good deal of easterly wind.

Concord.—"Cases of consumption, of rheumatism and neuralgia are of frequent occurrence. The Concord River is a very sluggish stream, having less than three feet fall in twenty miles. There are extensive wet meadows on its borders, subject to be overflowed two to four times a year, and to remain saturated with water several weeks at each overflow. Early after the settlement of the country, permission was given to build a dam over this stream at North Billerica. Near the close of the last century this dam was raised to facilitate the operations of the Middlesex Canal, and since then the meadows have been growing worse, and remain saturated a longer time. Some twenty years ago, the old mill and dam passed into the hands of a manufacturing company which has raised the dam still more, and aggravated the difficulty. There is upon the borders of these meadows, for twenty miles or more, a damp, chilly atmosphere for considerable portions of the year, which may be supposed to account for many cases of consumption and rheumatism. We

* In the absence of weather-strips, double-windows, and furnaces, do they not also get more fresh air in winter?—Sko'r.

once got an Act of the legislature requiring the reduction of the dam, but the manufacturing interests of the State combined and repealed the Act the next year, and thus several hundred thousand dollars worth of property has been destroyed, and probably many lives lost, and much suffering endured to save two or three men the difference in the cost of running their works by water or by steam."

(From a non-medical correspondent comes the following.) "This excellent old town has been settled two hundred and thirty-five years, and in point of education and general civilization may fairly be claimed to be the equal of any town in the State. It is a quiet, agricultural town with no such press of business as to prevent the citizens from taking the best care of themselves, and no such multitude of children that they may not be taken proper care of. Indeed, in one school district where there was formerly a large school, of late there have been too few children to form a quorum, and the school has been discontinued.

"The houses are nearly all old, and have been occupied for a half century or more. We see therefore that there has been time enough to get things into comfortable order, and I do not know why we may not fairly presume that Concord, as to its provisions for drainage and ventilation, is as well provided as most other towns. Now for the facts. A High School was finished for occupation about a year ago, at a cost of twelve thousand dollars and more, under the direction of a committee of some of our best citizens, and there is not yet the slightest pretence of any ventilation, except by opening the windows.

"When the matter was discussed at our recent town meeting, the only reason given for not providing ventilation for that school-house was that, of the nine other school-houses in town, none of them had any better means of ventilation, and that it was very expensive to ventilate, any way. The town however voted to begin their ventilation of school-houses at once with the new building.

"The absences from schools in Concord from illness have been, during the past winter, very great, and I have no doubt that want of ventilation was the cause of much sickness and loss of progress in the classes. So much for ventilation.

"Now as to drainage. To-day (April 21, 1870), probably one-half and more of the houses between the railway station and the Soldiers' monument, comprising the most substantial and compact part of the village for half a mile on the two principal streets, and two or three cross streets, have the bottom of their cellars covered with water to various depths, from a few inches to two feet. There is no pretence of any drainage to these cellars. The plain fills with

water in the spring, and it rises in the cellars. The old casks, and tubs, and planks, and vegetables, and dead rats and other nameless horrors, float and soak and exhale their aromas.

"The furnace fires are drowned, and the oldest inhabitants are very much surprised, as they have been for a century or two, at the wetness of the season.

"When I bought my house three years ago, I drained it with tiles 240 feet across the road, at a cost of less than \$25, and it is now perfectly dry. It had been occupied seventy-five years, with a foot or two of water in the cellar once in two or three years during the spring."

Chicopee.—Our correspondent sends a drawing, showing the position of the town and the central village, with reference to the rivers which bound it on two sides. On the other sides are hills abounding in springs. Both the air and soil are unusually damp. He says: "From the location of the town, the dampness of the soil, the many springs running to the rivers, it might be expected that diseases of the lungs and throat would be prevalent, and especially consumption; but, after careful investigations and many inquiries, I find that these diseases are no more rife in Chicopee than on the highlands which stretch away on one side to the Berkshire hills, and on the other to those of Worcester county." Water is conveyed to the central village from neighboring springs, and is of great purity.

Coleraine.—"I think that erysipelatous diseases and fevers of the typhoidal type prevail in this region, and in the western part of the State generally, more than they do farther east. I think I have also observed a periodical element in various diseases which I refer to malarial influences. I cannot fully account for the prevalence of zymotic diseases, but I believe that increased knowledge of the conditions of health, and greater cleanliness in the neighborhood of farm buildings, with land drainage, will help much to prevent these diseases.

"The mill-ponds near our factory villages, I think render the air foul in times of drought."

Dennis.—Soil quite different on the two sides of the Cape at this point; on the south side, sandy; on the north side a stiff clay sub-soil. There are several diseases which present different appearances, as our correspondent believes, from this circumstance. Scarlet fever is one of them, and is more fatal on the north side. Lung

fever prevails on the north side. Tobacco is doing much to shorten life. "There is another thing which should receive your attention. It is the intermarriage of relations. In this locality the effect is truly dreadful. There are, I think, more than fifty children of cousins who are either straight-out idiots or feeble-minded."

Dudley.—"Lung diseases are most prevalent here; pneumonia, pleurisy, bronchitis. I think that cases of consumption are rather more frequent than in adjoining towns. I cannot account for it unless it is from the wet soil. The subsoil is clay. Location, high and exposed to winds."

Essex.—Diseases of the air-passages; also, in a less degree, rheumatism. "There is but little doubt in my own mind that the prevalence of these diseases is dependent on the chilly, damp east winds which continue here a considerable portion of the year." Soil, clayey and rather impervious to water.

Fitchburg.—Purity of water supply from wells becoming questionable, from the increase of population. A reliance on the surface water not regarded as safe in the future. Wells and springs becoming gradually less pure.

The opinion is expressed that consumption is not less frequent now than formerly, and that the apparent diminution is due to more careful registration.

Falmouth.—Pulmonary affections very common, and the most probable cause found in heavy fogs and cold winds.

Fall River.—Consumption, catarrh, dyspepsia and nervous diseases are prevalent. The first two are due, in a certain degree, to the localities. The town is exposed to cold, damp fogs, and has a large body of fresh water on the east, and Narragansett Bay on the south-west. Soil wet and impervious to water. Consumption is very prevalent among the foreign population, who have not the slightest knowledge of hygienic laws, who live in a crowded condition in the midst of filth of all kinds, and sleep in poorly ventilated rooms. These conditions are perhaps even more conducive to consumption than the location of the city.

Groveland.—No prevalent disease since dysentery in 1866.

Gloucester.—"The atmosphere in spring and summer is sometimes

rendered exceedingly offensive by emanations from decaying fish, either thrown into the harbor or spread upon land as manure.

"I am not aware that any disease has been engendered by this contamination of the atmosphere, or that those prevalent at such seasons have been peculiarly aggravated."

Groton.—Influenza has been very prevalent from atmospheric changes. A prominent cause of consumption is the want of ventilation in houses. As soon as cold weather comes people shut up their houses as tight as possible, and then, with stoves, heat them to such a degree that they become very sensitive to cold on going out of doors.

Hanson.—"The region in which I practise is considered healthy and not subject to any special disease. There are, however, small localities where it might be expected that health would be affected; and indeed I think it is. Here fevers are more serious; scarlet fever is attended with more ulceration of the throat; common inflammation of the throat is more apt to pass to ulceration, and ill-turns are more frequent. These localities are low and wet, being near cedar swamps and marshes, and sometimes foggy. This cause affecting health cannot be removed, but only mitigated by proper care and management."

Hinsdale.—"Scarlet fever has been very prevalent and fatal in this town during the past year, and has been confined almost exclusively to the foreign residents, operatives in the mills. Why the disease should be restricted to this class of our population I cannot explain, unless it be from their crowded tenements and less cleanly habits."

Hingham.—Consumption a very common disease but not to be regarded as specially prevalent. "I do not notice that this disease appears with greater frequency near the harbor, which is a flat at low tide, or along a slow-flowing stream which runs through a low marsh, on the borders of which a portion of the town is built for over a mile, than in what is known as South Hingham, which lies on an elevated and well-drained plain."

Holmes' Hole.—Bronchial affections very common in winter and spring. The winters are open, with rain instead of snow, and a humid atmosphere. Much exposed to winds from north-east, east, and south-east.

Hadley.—Cerebro-spinal meningitis has been frequently observed here. The cause entirely unknown. "The type of all disease is low, the nervous system showing great depression from apparently trivial influences. After ordinary colds, pleurisies, pneumonia, erysipelas, etc., there will be great depression, feebleness, sighing, tendency to nausea, etc.

"Six or seven years ago we had diphtheria very severely, and since have had more or less of it, but in a milder form. I know of no special agency in producing the tendency described." The soil not wet except during freshets. The air apparently pure. The houses *much* shaded.

Hudson.—"We have not been free from scarlet fever since the autumn of 1866. The site of the village is low, but with a dry and pervious soil. In the hot season the purity of the air is somewhat affected by decaying vegetation in surrounding ponds."

Hubbardston.—Our correspondent reports thirty persons living in this town who are over eighty years of age, including one aged ninety, two aged ninety-one, and one aged ninety-six. Population in 1865, 1,546.

Leominster.—No diseases specially prevalent during our correspondent's practice of thirty-two years. He believes that consumption is less destructive than it was a quarter of a century ago, and thinks it accounted for by improved methods of treatment, and by better sanitary regulations in families arising from greater intelligence concerning the causes of disease.

Lunenburg.—Our correspondent at Fitchburg sends us the following letter on the 31st December, 1870: "In the south-east corner of Lunenburg there is a reservoir pond covering about 1,000 acres, from which several mills are supplied in Shirley Village. Last summer and fall this pond was drawn unusually low,—never so low before. The pond is shallow, and a great amount of vegetable matter must have been exposed to the sun by this unusual drainage. Scarlet fever of a malignant type has prevailed on the borders of this pond and in Shirley Village, some three miles below, for several months past. I think, in a very sparse population, six deaths have occurred, and from those cases which I saw in consultation I think they died early from *blood-poison*, and not from anginose or local trouble. It has occurred to me that possibly a local influence, from decaying vegetation in that old drained reservoir, may have pre-

pared the '*nidus*' in these patients for an intense and malignant development of the specific germ of scarlatina. Or is it possible that the unknown 'entity' which produces scarlet fever may have a spontaneous generation in wet, decaying vegetable matter under the influence of a hot sun?"

Lexington.—"Situation quite high; soil generally dry. There is little or no stagnant water in the warm season. The air is pure except in so far as it is affected by four or five piggeries of some size, supported by slaughter-house offal and city swill."

Lenox.—Houses much shaded.

Lowell.—See remarks under the head of "Typhoid Fever."

Littleton.—Reference is made to slaughter-houses existing in the town which render the air of their neighborhood foul from decomposing animal matter.

Lynn.—Our correspondent, representing the opinions of the City Medical Society, replies that functional diseases of the uterus are of very common occurrence, and that this special prevalence is due to the use of sewing machines, run by foot-power.

We are also furnished with some interesting facts, reduced to tabular form, and designed to show the comparative healthfulness of two great divisions of the city, one of high land, the other of low land. The population of these sections in 1870 is obtained from the United States census in advance of publication. The comparison has been made by Dr. J. O. Webster, under the direction of the Lynn Medical Society.

TABLE I.

Showing the number of Deaths from the Diseases specified, in the City of Lynn for the years 1865-69, inclusive, east of the line of Washington Street, excluding all doubtful cases.

HIGHER SECTION OF THE CITY.

YEARS.	Consumption.	Typhoid Fever.	Dysentery.	Cholera Infantum.
1865,	44	14	17	9
1866,	37	12	13	13
1867,	41	7	—	16
1868,	48	8	—	13
1869,	46	9	4	18
Totals,	216	45	34	69

TABLE II.

Showing the Deaths, as above, west of the line of Washington Street.

LOWER SECTION OF THE CITY.

YEARS.	Consumption.	Typhoid Fever.	Dysentery.	Cholera Infantum.
1865,	44	28	9	13
1866,	50	18	9	10
1867,	43	3	2	8
1868,	43	15	2	17
1869,	54	11	1	14
Totals,	234	70	23	62

Population of the north-east or highland section,—

1865, 11,731

1870, 16,710

Population of the south-west or lowland section,—

1865, 9,016

1870, 11,521

Mean population of the north-east section, . . . 14,220

Mean population of the south-west section, . . . 10,268

In 1865, the deaths from consumption were, in the north-east section 3.75 in 1,000 of population; in the south-west section 4.86 in 1,000. In the same year the deaths from typhoid were,—in the north-east section 1.19 in 1,000; in the south-west section 3.10 in 1,000.

The average annual mortality in the five years 1865–1869, inclusive, from consumption was, in the north-east or highland section 3.03 in 1,000 of mean population; in the south-west or lowland section 4.55 in 1,000.

Same years, from typhoid fever in north-east or highland section, 0.63 in 1,000; in south-west or lowland section, 1.36 in 1,000.

The percentages of dysentery are very nearly alike in the two sections, while cholera infantum shows only a slight preponderance on the side of the south-west or lowland section.

Middleton.—The town is hilly and of generally uneven surface, but there are long tracks of meadow on which grows a coarse grass. These meadows are sometimes covered with water, and are always

wet. The banks of the Ipswich River are also frequently overflowed. There are no unhealthy exhalations from these meadows, river-banks, nor from the ponds. Soil loamy and gravelly. There are now living in this town forty persons between the ages of 70 and 92. Population in 1865, 922.

Nahant.—Our correspondent reports a severe epidemic of whooping-cough during the summer of 1870, but no diseases specially prevalent in a series of years.

Nantucket.—Neuralgia, rheumatism, catarrh and lung affections the most common ailments, and influenced apparently by cold and dampness in the winter and spring. Not removable.

Northborough.—"No diseases especially prevalent. During the past twenty years dysentery and scarlet fever have twice prevailed extensively, with a large number of fatal cases. I think we have very few cases of consumption, but there are two families, one in the west and the other in the south part of the town, where nearly all the members have been affected with this disease. Both houses are in certain respects alike, both are situated very low, and fronting a large expanse of low meadow land, which causes them to be very damp during most seasons of the year. This, it seems to me is the cause of the disease. I have a case in Boylston similarly situated, and in which I find the same cause."

North Adams.—Typhoid fever very common in the autumn. Tubercular diseases always, though less prevalent than formerly. Mountains and valleys seem equally exposed to both diseases. The town lies in a valley with mountains on the east and west sides; consequently there is less sunlight than in most places. Morning fogs were formerly very common, but of late years are rare. The cause of this change is unknown.

Newton Corner.—"No disease specially prevalent. Village composed almost entirely of well-to-do or wealthy people, who live in houses quite well ventilated, with plenty of room about them now. The matter of drainage will soon demand attention. Surface water is carried off quickly by brooks running into Charles River.

"Where there are water-closets no cess-pools are provided and the drainage is into the ground. In some parts of this village there is complaint of wet cellars at certain seasons. I have not, in such cases, noticed any more disease than in other and drier parts of the

town. Perhaps there is not so good a state of health, that is all. No standing water in any part of the village. Subsoil gravelly, or sand and clay."

Newton Centre.—"The only disease which has a marked prevalence is dysentery, and that is almost exclusively confined to a region south-west of this village bordering on an extensive peat swamp, and drained by a sluggish creek. A fatal epidemic of diphtheria prevailed in this same region six years ago."

New Salem and North Prescott.—Consumption is prevalent. In some measure it seems to be developed by working on palmleaf, an occupation which gives employment to a large number of females in this vicinity. In trimming the leaf there is much fine dust. Those who braid are constantly wetting the hat so that the leaf will not break; their fingers are, in this way, exposed to cold. These occupations are favorable to the development of consumption on account of sedentary habits and in-door life, as well as from exposure to dust, and to cold and wet hands. Other causes are found in the character of the soil which is rather a heavy loam, very stony, rather impervious to water, and with swamps in many localities. A large proportion of cases of consumption met with have been on high ground. Drainage of the soil is much to be desired.

Orleans.—Consumption prevalent; also typhoid fever. Soil generally dry and sandy, but few swamps or marshes (except salt marshes), but a great number of ponds of pure water with no natural outlet. Township nearly destitute of timber and much exposed to winds.

Provincetown.—Rheumatism a disease specially prevalent in this town, both inflammatory and chronic; affecting children as well as adults, women as well as men.

Plymouth.—"In the south part of the town, along the basin of a small river flowing into the sea, consumption is frequent. The soil is in this basin low and wet."

Pittsfield.—Houses too much shaded. [See under head of "Typhoid."]

Randolph.—Consumption is less fatal, and probably less frequent, in the past few years than previously, and is not now regarded as

especially prevalent. "It has not been observed by a majority of the physicians practising here that this disease affects preferably any particular districts. Nevertheless, it is the experience of one gentleman that in his neighborhood, swampy tracts of land have furnished more cases than dry, exposed upland."

Reading.—Consumption very prevalent. Our correspondent says: "I cannot account for this prevalence except from dampness, and this is only partially removable. Much of the land is low, level and wet, and much of the higher land is retentive of moisture. In spring many cellars are partially filled with water for a considerable time."

Rockport.—Our correspondent furnishes the following sketch of the climatic peculiarities of Cape Ann, and the diseases of that section of the State, derived from observation extending through thirty-three years of practice.

"The surface of Cape Ann, on the north-east extremity of which I am located, is mostly elevated and dry, rising on all sides towards the centre more or less abruptly, and varying from one to two hundred feet in height. It is thickly studded with boulders which were once part and parcel of the underlying granite, and which probably, as successive portions formed the coast, have been thrown up by the waves, and, along with the gravel and the sand, the products of their attrition and disintegration, constitute the greater part of the soil. There are portions of the Cape where, for acres, these boulders lie so close to each other that a man cannot thrust his foot to the earth between them, or a sheep, with nose ever so much sharpened, crop the herbage that ventures to spring up among them.

"There is comparatively little low, wet or boggy land, and from the character of the soil, there is little mud in wet weather, and, if allowance is made for the vast amount of teaming from the granite quarries, there is little dust in dry weather.

"Near the centre of the Cape is a clear and deep pond, between two and three miles in circumference, which furnishes a bountiful supply of ice in winter, and from which issue two fine brooklets running to the ocean, one across the north-western, and the other through the eastern part, passing through the centre of the village of Rockport.

"Springs of pure water are not unfrequent, though most of the water used for drinking and for culinary purposes is obtained from

wells. From whatever source, it is probably as free from impurities as in any part of the State.

"On the whole, when the materials of which the Cape is composed are considered, so little adapted to harbor the causes of disease, the diversified yet elevated landscape, and the thorough washings of the surface and stirrings of the air which the storms compel us to submit to, it must be regarded as most favorable in a sanitary point of view, in so far as these causes operate.

"The climate of Cape Ann may be said to be a little exaggeration of the climate of the New England coast generally. The Cape itself, being an island rather than a cape, is exposed to the full influence of the sea-breezes in all directions, and the summer's heat and winter's cold are tempered by them accordingly. A difference of five degrees I have often noticed between the extremes of cold reported at Worcester and by our thermometer. On the hottest day of the present season it reached ninety-four degrees. I believe it never rises above that point here, or falls lower than seven degrees below zero.

"As the water warms less rapidly than the land, in the early part of the season, and cools more slowly in the latter part, we are subject to damp and chilly winds from the ocean in the spring and early summer months, engendering a good proportion of rheumatic and catarrhal affections; while from July to December, we are repaid by the tempering of the extremes of heat and cold which render this Cape a pleasant abode for the invilid and pleasure-seeker. One striking effect of the tempering of the sea-air is the fact that in winter it often rains here, when a few miles inland it is snowing, and, as a consequence, there is good sleighing in the neighboring towns, when the Cape is bare.

"Another peculiarity, though from a different cause, is that in summer the showers seem to be 'balky.' A large area of the centre of the Cape is elevated, denuded of trees, and therefore, in the warm season, hot and dry. The heated air arising from this surface prevents the condensation of vapor above it, and in a dry season we are often tantalized with the prospect of a shower which has already refreshed our more fortunate neighbors, Essex and Manchester, the cloud rising and splitting just over our heads and passing over Massachusetts Bay on one side and Ipswich Bay on the other, and distributing its treasures where they are not wanted. Similar effects are observed at Cape Cod. I have been told by residents of that cape that it is no uncommon thing to witness a shower arise, and swing round the circle, replenishing the ocean on both sides with fresh water before a drop falls on the parched sand.

“The only disease that has been thought to be specially prevalent here is consumption, and it has been the fashion to attribute it to the prevalence of east winds. That in the spring and early summer months this cause, by producing catarrhal affections, may occasionally hurry on, in the predisposed, the disease in question, may be admitted, but a very large proportion of the cases I have witnessed here have been hereditary, or due to a predisposition generated in families by unfavorable hygienic influences, such as confinement in closed, small rooms, sedentary habits, intermarriages, neglected or mismanaged skin diseases, (a cause more fruitful than is usually supposed,) and an innutritious diet. Seldom has this disease entered a family without a number falling victims one after another of those who are usually most in contact with the sick, until large families have sometimes, from this cause, become nearly extinct. There is no doubt in my mind of the infectious nature of this disease, and, consequently, that there would be a great diminution of the mortality could those constitutionally predisposed be separated from the sick. An important fact bearing on the question of the influence of the sea-winds, and which seems to me decisive that they are made the scape-goat for violation of hygienic and social laws, is that while our best lands lie on the most easterly and exposed parts of the Cape, and our farmers are out in all weathers, not an instance has occurred of a farmer dying in consumption during my residence here, while repeated instances have occurred where the sons of farmers have left their father's employment, and becoming students, or entering into mercantile pursuits have fallen in the prime of life victims to this disease. Nor is this exemption confined to the period of one generation. Our oldest citizens inform me that they have no recollection of a farmer dying in consumption.

“The east wind bloweth where it listeth, and we cannot regulate the dampness thereof. If it is a cause it is an irremediable one; but if it is the chief cause here, it is a little remarkable that those most exposed to it should suffer least from the disease.

“With regard to other diseases, my experience has furnished nothing to lead me to think that they differ in character from those of the New England towns generally, especially of the towns on the coast.”

[Remarks on typhoid fever and cognate diseases may be found under that division of our correspondence.]

Rehoboth.—Pulmonary affections most prevalent. The acute forms of these diseases occur during the breaking up of winter.

Consumption generally hereditary. The soil where it prevails is wet, impervious to water, and low in situation. Air rendered impure by stagnant water in large swamps. People persist in living in the worst parts of their houses, and where the sun does not come, and thereby do injury to their health.

Stow.—"In the lower portion of Assabet Village there were last autumn a good many cases of typhoid fever, and they were confined to that portion of the village which is built upon a meadow which has once been cut over for its peat, and left to fill up again. The builders have two modes of preparing their foundations for building upon this old peat flat. One is to dig out the mud for three or four feet and fill up with sand or gravel, on which they build their houses. The other is to drive spiles into the mud ten or twelve feet, and cover them over with stones and sand. They dig their wells in the mud-hole and use the water for drink and for culinary purposes. But this is not the whole story. They build their privies and pig-pens near their houses, and their sink drains add to the accumulated filth which is all mixed up with the water they use.

"From this swamp there is no proper drain. Right opposite this bog-hole is a pond belonging to the paper-mill, which is often drawn off during the night, exposing a surface covered with decaying vegetable matter, the odor from which is much complained of by those living near. Draining the swamp, which can be done without great cost, would contribute much to the health of the people who live upon or near it."

Southampton.—"Diseases of the respiratory organs are common in winter, and of the digestive organs in summer; and they both depend more upon the season than the locality."

South Hadley.—"Diseases of the nervous system are much more prevalent during the past six or seven years than formerly, appearing to affect all ages. The cause is entirely unknown. No unfavorable conditions of earth or air discoverable.

[See Hadley for similar observations.]

Stoughton.—"Our correspondent has practised in the town for forty years. He says: "Travelling westerly from the centre of this place, two miles, on a street where there are perhaps two hundred persons, I find the oldest of them is seventy. Going the same distance in the opposite direction there are about the same

number of people, but I find three couples all over eighty, and three widowers aged from eighty-one to eighty-five. I know of no essential differences in the situation, except that the land where the older persons live is considerably higher, and I should judge more pervious to water."

Stockbridge.—"In all this immediate vicinity, except on the hills which almost encircle us, there is a vast deal of moisture arising from the close proximity of the river, with abundant low grounds and frequent overflowings, on the south side, while to the north lies a flat marshy meadow at the foot of the hills.

"From these surroundings one would look for rampant consumption, if imbued with the doctrines of Dr. Bowditch on this subject, but while that scourge was at large among us years ago, we now see comparatively little of it, though catarrhal troubles are not infrequent. While our settlement is on very level ground, it is nevertheless a sort of knoll, with a porous, sandy soil,* through which water readily permeates to the meadows about us. The meadows on the north, I have thought, might be drained, and certainly should be, if possible.

"If any one characteristic of disease has shown itself more than another within the range of my practice, it has been a tendency to functional disturbance of the liver and of the digestive system, usually classed as biliousness. Some of these troubles I have been inclined to attribute to the great heat maintained in the dwellings. I have often found some of the foregoing difficulties almost incurable until I could induce the parties to keep a thermometer in their rooms and regulate them to a more temperate heat. Our streets and houses used to be very densely shaded, so that one could scarcely see some of the dwellings from the street. By incessant cryings out this state of things has been very essentially modified, and the people seem to be waking up to the possible utility of a little sunshine."

Somerville.—"This town has been represented as favorable to the development of consumption, but after a residence here of fifteen years, I do not find it to be so. On the contrary, I find less of this disease in proportion to the population than in Truro, Mass., which is dry and sandy, and where I practised medicine twenty years.

"Of our foreign population I will only say, that if there is any

* A noteworthy fact with reference to the relations existing between "soil moisture" and consumption.—Szc'r.

bog-hole, they will get as nearly into it as possible, and they seem to thrive in the mud.

"Tobacco is doing much to undermine the constitutions of the people."

Shrewsbury.—Pulmonary diseases prevalent, and this owing to the general characteristics of the district: soil wet; tolerably pervious to water; great exposure to north and east winds.

Sutton.—Tubercular disease most prevalent. "My own opinion is that, in certain instances, it depends upon the character of the soil, and, in others, to proximity to streams and ponds, removably perhaps, partially, by extensive drainage. The situation is generally elevated and hilly, but the soil is for the most part heavy, impervious, or only partially pervious, to water; springy and wet quite late in the season; retains moisture on or near the surface a long time after rainfall.

"A small portion of the town has a soil differing very much from this; sandy, pervious, low or lying along the borders of streams or ponds. Very few wet meadows or swamps. Several ponds of clear water. Frequent fogs in the valleys and near streams."

Salem.—Consumption very prevalent, and due, in the opinion of our correspondent, to three causes, chiefly; 1st, the character of the soil; 2d, want of proper drainage; 3d, exposure to harsh winds.

"The soil in this city is, on one side, upon the surface a clay loam with a subsoil of damp, heavy clay, which is nearly impervious to water; on the other side, loam with a subsoil of sand very pervious to water. The city is bounded on three sides by tide water, and much exposed to harsh east winds. In one locality, where consumption is often met with, the ground is high and the soil gravelly; but on one side of this rising ground is a pond, the water of which during the summer becomes very stagnant, its emanations necessarily poisoning the air in the neighborhood. A portion of the city is made land, which was formerly a marsh. It seems to me that a thorough system of drainage would, in a measure, remove the unhealthy character of the soil; but the exposed position, the easterly winds, and the dampness which must necessarily arise from water on three sides, must always, I think, render this district the favorite seat of consumption."

Stoneham.—"Scarlet fever the only disease which seems to be

prevalent. For the past fifteen months it has been present. Cases of an extra severe type have occurred in well-to-do families as frequently as in those of the poor. Principal sanitary deficiency of the town is want of drainage. There are two tanneries. In the warm weather, the *open* drain connected with these establishments gives off very offensive gases. This drain is, in fact, the common sewer for a great part of the town, and many privies empty into it. It should be arched and covered over with earth."

[The Secretary can testify to the foul state of the ditch above referred to. Its condition has been the subject of fruitless litigation. It is certainly the duty of the town authorities to remove this nuisance before it occasions an outbreak of unmanageable disease.]

"In some boarding-houses in this town, six or eight persons occupy a small bedroom, and it is quite common to find four in one room, say thirteen by fourteen feet."

Taunton.—"Diseases of the respiratory organs have been unusually prevalent during the past winter and spring. The late autumn and early winter were comparatively mild, and were followed by a sudden change to cold and wet weather, which severely affected children and aged people. Many of our hale old men died in a very few days of congestion of the lungs; and many consumptives, who had been getting along tolerably, became exhausted and died.

"Tubercular affections are constantly under the care of our physicians.

"Taunton lies in a basin encircled by hills from one to three hundred feet high. This ridge is complete, except where the river causes a break. The Taunton River is tidal, emptying into Mount Hope Bay, seventeen miles below. Dense fogs roll up from the sea at times, and are retained in this basin, alternating with easterly winds. The land is swampy, and the drainage very imperfect. The city is built on the banks of the river, and when the tide is out the surface of the water is not more than four or five feet below the adjoining land. All the houses are built with cellars six or seven feet below the surface of the land. These cellars have from six to eighteen inches of water in them for a considerable part of the spring. The houses are heated in many instances with furnaces to a temperature of 70 to 74 degrees.

"When east winds set in, a constant flow of damp air, alternating with heated currents, pervades the buildings. Catarrhal affections are very frequent; rheumatism, chlorosis and anæmia appear among those who are compelled to remain within doors.

"It is a prevalent custom to keep the window-blinds constantly

closed, thereby excluding sunlight. The furniture and closets are damp in wet weather, and when the season of fogs sets in, constant care is required to keep clothes from mildew."

Truro.—Consumption prevalent. "I think this is owing to the east winds and fogs from the ocean, and also somewhat to the mode of living, as there is but little fresh meat used here."

Topsfield.—Consumption prevalent. Special cause found in wet soil, which may be improved in some degree by drainage. The soil of the hills, as well as that of the lowlands, is wet.

Air has been rendered putrid by the emanations from slaughter houses which have existed many years in and near the village.

Tisbury.—"Influenza has been recently very prevalent, affecting all ages. Rheumatism, both acute and chronic, is a common disease, and doubtless owing to cold and damp, and the occupation of the people. Of chronic diseases, dyspepsia is the most universal; nearly every other person you meet suffers from indigestion in some form. The causes are chiefly the mode of cooking, and irregularity in eating. The frying-pan is in universal requisition. Still I believe that the sudden changes of temperature, to which we are subject, produce their effect on the digestive organs. We have a large proportion of 'nervous people,' so called, especially in the upper or western part of the island."

West Newbury.—"The soil a clayey loam, impervious in a great degree to moisture. As the hills have been shorn of their natural growth, the intervening swamps have become suitable for cultivation, but are still wet and cold, until the surface water has run off or evaporated. There are very few cellars in town that have not water in them during the wet season, and they are almost always damp. I have heard many complain this spring of having a foot or more of water in their cellars. The consequence is that consumption in its various forms finds many victims. In the westerly part of the town is a swamp two miles long and half a mile wide which produces wood, or, if cleared, an inferior grass. By ditching it and clearing out as old and useless land, the whole district would be rendered more healthy. The condition of the town as regards both food and sewerage, would be improved by thorough drainage."

"As a rendered food in the neighborhood of swamps, from a mass of the bones of slaughtered cattle. This is taken out and

out in piles, making an almost intolerable odor, and constituting a nuisance which ought to be abated."

Wakefield.—Two severe epidemics of dysentery have occurred in the past six years, coming on when the surrounding bogs were dried up. Soil usually very wet. Cellars have more or less water in them nearly all the time. Houses are damp,—much mould observed in them. Both epidemics of dysentery were preceded by an epidemic of scarlet fever.

West Boylston.—Typhoid fever rather prevalent and has been for more than twenty years. Cause not obvious. A river town with interval lands ascending to beautiful hills. Most of the wood cut off. Soil pervious in some parts, impervious in others; somewhat springy. Interval lands not well drained. Drainage, much neglected.

Westborough.—"Situation of village low as in a basin, shut off from winds, with dry soil and subsoil of quicksand. Typhoid fever and consumption much more rare than on the exposed hills around us where the ground is wet from a clay subsoil."

West Roxbury.—Believed to be a more favorable place for consumptives to live in than many others. The deaths occurring from consumption are, in great part, of persons who have come here to live, after being attacked with the disease.

West Stockbridge.—"Pneumonia and bronchitis are quite prevalent. I attribute this to the occupation of the people more than to anything else. The mining of iron ore is the chief business. The miners work underground in wet and damp places; they come to the surface in a state of perspiration and are thus subject to sudden changes of atmosphere. This district, like all of Berkshire County, is mountainous. The village is situated in a valley with a mill-pond in its midst, which in summer is often quite low and from which arises offensive effluvia from decaying vegetable matter; yet all the epidemics that I have witnessed here have originated and been most severe on the high ground. These epidemics have been dysentery, diphtheria and measles."

Winthrop.—See remarks under the head of Typhoid Fever.

Wrentham.—This region seems to be remarkably conducive to

health; elevated, well-drained, good water. Excellent natural sanitary advantages; of course, some minor artificial nuisances exist; little attention is paid to the condition of cellars; drains and privies are often in too close proximity to wells, giving rise to dysentery and typhoid.

Wellfleet.—Affections of the lungs prevalent. The general cause is found in locality. Exposure to cold, damp, east winds. Consumption is more prevalent in the valleys that run across the Cape, and on damp soil.

Weymouth.—Diseases of respiratory organs prevalent; due in great part to location of village; exposed to east and north-east winds. Soil clayey and moist.

“Bone factory does not tend to purify the air.”

Walpole.—Our correspondent refers to the cases of “charbon” or “malignant vesicle,” which have occurred in Walpole and which are separately described in another part of this volume.

Worcester.—No disease is found to specially prevail during a series of years. The proportion of consumption is large, as it is everywhere. Smallpox and varioloid have recently been very prevalent, but the epidemic has now subsided as vaccination has been general. Large numbers of persons at all ages were found to be unprotected by vaccination. The opinion is expressed by our special correspondent that greater power to enforce vaccination and, in case of need, to remove cases to a smallpox hospital should be given to local boards of health.

The subject of drainage is receiving much attention in Worcester. Through the heart of the city runs a brook which is now being enclosed by a covered stone wall, to be used as the main sewer. A complete system of sewers is in process of building; the outlet will be the Blackstone River.

Waltham.—Consumption more prevalent than in some of the neighboring agricultural towns, but not more so than in manufacturing towns generally. Waltham is situated in a basin drained through its centre by Charles River. Soil generally light and porous.

It is worthy of observation that although the people living in the immediate vicinity of the manufactory of sulphuric acid in this town are, during every damp day, constantly subjected to an at-

mosphere sufficiently charged with sulphurous acid gas to be very irritating to the air-passages of a person first coming into it, neither they nor the people engaged in the manufactory are apparently in any way permanently affected by it.

Westhampton.—Regarded as an exceedingly healthy town. Soil loose and stony. Good elevation. Very hilly. Excellent drainage. Our correspondent is informed that scarlet fever, although often present, has been for eighty years past non-malignant, and his observation in recent years confirms it.

Upton.—Lung diseases prevalent. Soil rather dry on the low lands and springy on the high lands. Not, on the whole, wet.

“A very large proportion of the women work on straw goods at their homes. From January to June, which is the busy season, they often work immoderately. I have theorized that this has been one strong predisposing cause of consumption; 1st, by overtaxing the strength; 2d, by the dust and fumes from the braid (much of which has been treated with sulphur and oxalic acid), irritating the sensitive throats, exciting cough and opening a road to disease.”

CHARBON IN MASSACHUSETTS.

BY

ARTHUR H. NICHOLS, M.D., OF BOSTON.

ON THE OCCURRENCE OF CHARBON, OR MALIGNANT VESICLE, IN MASSACHUSETTS.

In comparing the maladies which affect mankind with those to which the lower animals are subject, we cannot fail to be impressed with the fact, that it is with the greatest difficulty that contagious diseases can be transmitted from the former to the latter, and even when the attempt is apparently successful, the symptoms invariably assume so mild a type as to be scarcely recognizable. Thus, the material containing the poisonous element of smallpox, scarlet fever, measles or syphilis has been repeatedly introduced into the blood of cattle, horses, sheep, dogs and rabbits, in the majority of cases without any visible result, and in no instance producing serious symptoms.

Man, on the other hand, by no means possesses the same immunity with regard to the diseases of inferior animals, for some of the most virulent and fatal affections to which we are subject, such as hydrophobia and glanders, are derived from dogs, horses and cattle, and when once thoroughly established, in a large proportion of cases, in spite of all treatment, terminate unfavorably.

In the year 1853, there first appeared in the town of Walpole, in this State, a most singular disease, which was recognized by the attending physician as *Charbon*, or *malignant vesicle*, a malady known from remote antiquity as prevailing among animals, but observed among mankind only within a comparatively recent period.*

* A pustular eruption, accompanied with some local inflammation, and caused by the inoculation of putrid animal matter, is not uncommon among men employed in discharging vessels laden with hides.

This affection, which resembles an ordinary dissection wound, is sometimes ascribed to the action of some of the chemical substances employed in curing the hides, or to the bite of an insect which is thought to have been brought with them from South America.

In these cases the poison is as a rule quickly eliminated without producing any serious results, and differs essentially in its character and effects from that of *Charbon*, with which it may possibly be confounded.

The same disease has since revisited the same locality at irregular intervals, until, at length, during a period of seventeen years, twenty-six cases have come under observation, a very able report of which was given by Dr. Silas E. Stone at the last meeting of the Massachusetts Medical Society.

The object of the present paper is to review briefly the symptoms of the disease and the different theories of contagion, and, at the same time, enumerate the prophylactic measures which have been proposed to arrest its course and avert its recurrence.

This affection has of late attracted no little attention in Europe, where, in certain countries, and particularly in portions of France and Germany, it prevails extensively as an epidemic, whereas, in the United States, it is none the less interesting from the extreme rarity of its occurrence.

Different writers give very discordant accounts of the symptoms and morbid anatomy of charbon, so that it is difficult to frame an unexceptionable description of the disease. The fluctuations of opinion which have at various times prevailed on this subject are indeed remarkable; so that, even now, many standard authorities fail to distinguish the different forms which the disease is capable of assuming.

Recent researches, however, have materially diminished the uncertainty connected with the matter, and it is now established that the poison of charbon, like that of scarlatina and syphilis, may manifest itself in a variety of ways, sometimes causing external lesions in the skin, at other times attacking the spleen, liver, lungs, or intestines, in all cases, however, accompanied by severe constitutional disturbance. The identity of the different forms has been demonstrated by the fact that the poison of each is respectively capable of producing the others.

I.—SYMPTOMS.

Charbon is the result of a specific poison introduced into the body, and characterized by different symptoms, according to the method by which the virus enters the circulation. If implanted on some uncovered part, there is noticed, after a period of latency or incubation varying from a few hours to several days, a minute red spot or papule, not unlike a flea-bite.

This point now becomes the seat of a small vesicle which

soon bursts and dries up, and is afterwards surrounded by other similar concentric vesicles, at first separate, but subsequently confluent, and all running the same course.

Meanwhile, under and around the base of the original papule appears a well-defined layer of thick, hardened tissue, involving the thickness of the skin and compared to a disk of sole-leather, which creaks when cut with a knife, presenting almost as much resistance as cartilage. The cut surfaces have the appearance of ordinary fibrous tissue, mottled with black pigment. At the same time a peculiar gangrenous inflammation, not unlike erysipelas, arises from the point originally affected, and spreads in all directions with the greatest rapidity. Later, the inflamed tissue becomes firmer and darker, and loses all vitality, so that it may be pressed or even pricked without the patient being aware of it; the neighboring lymphatic glands become enlarged, delirium sets in, and death ensues with the usual symptoms of blood-poisoning. The duration of this variety of the disease varies from one to several days.

In favorable cases, the course of the inflammation is suddenly arrested; a vivid red circle appears around the gangrenous portion; the patient feels an agreeable warmth and returning pulsation in the affected part, and the dead tissue is finally separated from the living, in the form of a brown lozenge, leaving behind a suppurating surface of various extent in different cases. [Aitken, Virchow, Smith, Stone.] In rare cases, two or more vesicles have been noticed upon different parts of the same individual.

In another variety of the disease the external manifestations may be confined to a mere erysipelatos-like inflammation, without any vesicle (malignant œdema), while, in a third class of cases, death may ensue without gangrene, vesicle, œdema, or other external symptom whatsoever, which serves in a measure to mask the nature of the malady.

It must be confessed, the anomalous forms which charbon often assumes, and more especially the absence of all external lesions, render, at times, the diagnosis of the disease difficult if not impossible.

Virchow * states that he has not unfrequently met with cases

* Virchow ueber Milzbrand. Handbuch der speciellen Pathologie und Therapie. Erlangen, 1855. II. Band, 1 Abth.

where suspicious vesicles were present on the neck and face, and where death quickly ensued, which would undoubtedly have been considered instances of charbon, had they occurred in a district where this malady was prevalent.

II—SYMPTOMS IN ANIMALS.

In animals, as in man, there is not much constitutional disturbance at the beginning of the disease. The premonitory symptoms, according to Virchow, are loss of appetite, a stiff gait especially marked in the hind legs, a dejected look, trembling of the limbs and body, and a weak pulse. These symptoms become greatly intensified upon the appearance of the vesicles, which may occur in a few hours or not for several days. The pulse then increases in frequency, the temperature is raised and the respiration hurried. With the complete formation of the vesicle, the crisis of the disease is usually reached, and the unfavorable symptoms either abate, while the vesicle shrinks and disappears with the diminution of the fever, or, in other cases, a sort of gangrene attacks the affected part and death rapidly ensues. In other forms of this affection, as in man, death may be sudden and unaccompanied by vesicles, swelling, or other local manifestation.

In the so-called *Apoplexia Carbunculosa*, for instance, the strongest animals of a herd, while feeding, or at work, are at times attacked with dyspnoea, trembling, cramps and bloody discharges from mouth and nose, and succumb, either at once or in the course of the day. In other cases, the malady seems to bear a close resemblance to hydrophobia. Here the animals snap, bite, run and finally fall into a kind of fit, which may be followed by partial paralysis, and results fatally in one or two days.

It has been considered by some that the virulence of the attack depends upon the appearance of the vesicles. Garreau, for example who inclines to this theory, reports that of 118 cattle affected with charbon, 112, in which no external manifestations were noticed, died, whereas six upon which vesicles were formed, recovered. In horses, as in man, there seldom arises more than one collection of vesicles, but in cattle, several are frequently found upon spots remote from each other.

It has been noticed that, as in the cattle-plague, the poison

varies greatly in intensity at different times, as is indicated by the marked difference in the severity of the symptoms. It is remarkable, moreover, that, as in the former disease, not the feeble, but rather the stout, well-nourished beasts are selected as the victims.

While the progress of the disease is generally arrested by a very low degree of temperature, a warm, moist atmosphere is thought to be favorable to its advance.

III.—OF THE MORBID CHANGES IN THE TISSUES AND INTERNAL ORGANS.

These are almost identical in man and in animals. The principal seat of the disease appears to be the blood, for the changes in this fluid are uniformly the same. It is found to be darker and thicker than in health, sometimes having almost the color and consistence of tar, and being filled with minute parasitic growths known as bacteria. The spleen has also been found in most cases to be the seat of serious changes, forming the chief reservoir of the poison as in intermittent or typhoid fever. This organ is enlarged, and distended with dark-colored blood, while its substance is softened and at times almost fluid; and such is the constancy with which these changes are found that in France the name "*sang du rate*" has been given to the disease. The liver, lungs, kidneys and veins are all found to be distended and gorged with blood. In the venous system, this distension is best marked in the vessels of the subcutaneous tissue, intestines and lymphatic glands, while in all these localities ecchymosed patches are found, extending, in the case of the subcutaneous tissue, deep down between the muscles.

In the thoracic and abdominal cavities of animals, has been noticed a peculiar yellow, serous-like fluid which at times becomes almost gelatiniform, and which has been proved to be intensely virulent when introduced into the bodies of other animals. In man, however, while the changes in the lymphatic glands, and especially those in the immediate vicinity of the vesicles, is more frequent than in the cases of animals, the spleen and liver are less commonly affected, while the serous effusion in the thoracic and abdominal cavities is rare.

With regard to the situation of the vesicles, it is to be observed that the parts of the body which are usually uncovered (as the

face, neck, chest, arms, head, and, in certain trades, the feet), are almost exclusively affected. The disease, it is true, sometimes appears in other situations, but always under such circumstances that the apparent exceptions only confirm this fact. Thus, it is reported that a butcher, in slaughtering a diseased animal, placed a soiled knife between his teeth, and the malady appeared in the mouth. Again, the blood of a slaughtered beast trickled down the back of a man who was carrying it, and the disease broke out in the parts with which the blood had come in contact.

IV.—THEORETICAL CONSIDERATIONS AS TO THE NATURE OF THE MORBID POISON OR CONTAGIUM IN CHARBON.

The nature and origin of specific virus or contagium in charbon, as well as in other contagious diseases, has of late attracted the attention of several eminent observers, and although this whole problem is still involved in considerable obscurity, yet many of the physical properties of the poisonous principle have been demonstrated by careful experiments, the results of which there is reason to believe, will pave the way for additional and more practical conclusions.

The following summary of the facts and observations regarding the contagious principle, and the nature of the contagious process appears in a recent report* of Dr. Burdon Sanderson on the "Intimate Pathology of Contagion." It serves to give an idea how great advance has been made in this important field, and thus has a direct bearing upon our subject.

There are different liquids, existing in the diseased body, and characteristic of the various contagious affections, which, being introduced into the healthy body, have the property of reproducing the disease. It was with some of these infecting liquids that the experiments referred to were made, and vaccine lymph, being the most familiar, is selected as an example.

Dr. Lionel S. Beale first called attention, in the year 1864, to the existence in vaccine matter, of certain minute particles, transparent and of spheroidal form. These he regarded as living or germinal matter, and advanced the theory that they might contain the contagious principle. The same bodies were also recognized independently, about the same time, by Professor

* Twelfth Annual Report of the Medical Officer of the Privy Council.

Chauveau* of Lyons, who carried the investigation still further, and demonstrated conclusively that the activity of the vaccine matter is contained exclusively in these particles. M. Chauveau starting with these elements of vaccine lymph, viz., the recently discovered particles, the larger bodies, known as leucocytes, and the serum which holds them in suspension, proved,

First,—that the leucocytes when separated from the serum by simply allowing them to subside are absolutely inactive when employed for inoculation.

Second,—all the soluble elements of the lymph were next separated (by the so-called method of diffusion), and it was shown by repeated experiments on children and animals, that the soluble constituents, like the leucocytes, produce no result.

Third,—that the minute particles above described are insoluble, and that moreover the activity of the vaccine lymph depends entirely upon their presence.

These experiments were subsequently completely verified by Dr. Sanderson, and disprove the previously accepted theory, namely, that because vaccine matter is transparent, and moreover is most active when most transparent, that therefore the contagious principle must be soluble.

The elements of the contagious liquid of sheep-pox were examined in the same manner, and with equally satisfactory results. In this malady, it appeared that the infecting liquid is much more concentrated than in the case of smallpox, as illustrated by the fact that while in the former affection the liquid can be diluted with only ten times as much water without losing its activity, in the latter, three hundred times its weight of water may be added, without impairing its infecting quality.

If in the above cases the dilution is carried to a still greater degree, the chances of a successful inoculation are proportionately diminished, or, in other words, the greater the quantity of water added, the greater the chances of failure; but whatever the degree of dilution, the effect produced (provided any effect is produced), is invariably the same. These effects of dilution afford the strongest evidence that the contagious principle is composed of separate particles, and moreover does not possess the physical properties of a vapor, for no other hypothe-

* Determination expérimentale des éléments qui constituent le principe de la sérosité vaccinale virulente., Comptes Rendues, LXVIII., 1868, p. 289.

sis can be framed which tallies with the combination of phenomena here presented.

The assumption that the infecting virus is volatile, inasmuch as its effects are exercised at a considerable distance from its source, is then no longer tenable.

As to the specific gravity of the above particles, we are justified in inferring, that it must be the same as the fluid in which they are suspended, inasmuch as there is little or no disposition on their part to subside, so that however long the fluid containing the virus is allowed to stand the superficial layers remain as active as those beneath.

Another and more difficult problem is whether the particles of contagium owe their specific power to the fact that they are organized, and possess in themselves vitality, or whether their qualities are to be ascribed to their chemical composition. This question is purely a speculative one, and as yet involved in very great doubt.

Dr. Sanderson maintains that the phenomena of contagion, as manifested by the multiplication of the particles in the body is totally unlike any chemical change with which we are familiar. On the other hand if we assume the contagious principle to be a living, organic ferment, having the power of multiplication when deposited in living tissues, and that its simple transference will therefore be the exciting cause of the disease, then most of the phenomena to be accounted for may be explained in a very satisfactory manner. It is not necessary to assume that the blood-poisoning is the immediate result of the multiplication of the virus cells. On the contrary, from what is known with regard to the familiar ferment, yeast, it would seem more probable that this poisoning is the result of some chemical change in the constituents of the blood, caused by the growth of these cells within it. In yeast, for instance, we know that as the cells multiply, they absorb sugar, and secrete alcohol and carbonic acid, and it is not unreasonable to infer that, in a similar manner, the virus cells are nourished by extracting some substance from the blood and secreting in turn another substance, the presence of which has the effect of a blood poison.

There is every reason to hope that the experimental study of the various forms and metamorphoses of the organic substances

found in contagious matter, and the chemical changes which take place in them may in the end throw much additional light on the process of infection. In this connection may be mentioned the researches of Davaine and Hallier, who believe that certain organic forms known as bacteria and microzomes found in the contagious fluid, and which, when transferred to the blood of healthy from that of diseased animals, have the power of reproducing the disease, are identical with the contagious particles. M. Davaine claims to have proved, by experiments similar to those of M. Chauveau with vaccine lymph, that the poisonous element of charbon resides exclusively in these bacteria, and that when they are eliminated from the blood, the latter no longer retains its poisonous power. These organic forms (bacteria) are described by Hallier as consisting of cells either spheroidal or of the form of a short cylinder, and endowed with a peculiar progressive oscillatory movement. It has been demonstrated by Dr. Edward Schwarz* of Vienna that these cells are formed under certain conditions from still smaller organisms known as micrococci (microzymes) or microspores which have the appearance of minute round cells, filled with a transparent liquid and containing several nuclei. They differ in no respect from those spores or germs deposited in certain states of the atmosphere upon the moist surfaces of bread, vegetables and the like. It should not be overlooked, however, that these different parasitic growths have been found in the body in health, and they moreover accompany nearly every disease characterized by blood-poisoning.

Thus, bacteria are found in the blood in hydrophobia, glanders, syphilis and snake poisoning; micrococci abound in the blood in recurrent fever, and are still more numerous in scarlet fever; they are contained in the pustules of smallpox and cow-pox; also in the sputa in case of measles, and the alvine liquid of dysentery. As no specific difference exists in the appearance of these organic growths in the various diseases it is not pretended that the different contagia can be distinguished from each other. Inasmuch, however, as it has been noticed that under certain circumstances, the metamorphoses they undergo are essentially different, it is therefore claimed by Hallier that a distinction may be eventually found upon the different

* Wiener Med. Zeitung, April 3, 1870.



forms to which they gradually unfold. If this distinction can be demonstrated, it will, of course, indicate that a most intimate relation exists between the germs, and the different diseases in which they are found.

Other eminent observers, on the other hand, claim that no great importance should be attached to the presence of these organic growths in the blood, because, as has already been noticed, they are found in the body in health as well as in disease, and though multiplied greatly in certain diseases, they are really but harmless concomitants of the disease, acting as poisonous agents only by serving as rafts for transferring the morbid material. They maintain that these so-called germs, whatever may be their origin, remain passive or latent in the healthy body, but when, in certain morbid conditions, the blood and other fluids become diseased, they find therein an appropriate pabulum, by absorbing which they are nourished and multiplied just as, in the forests, certain vegetable fungi flourish only upon the trunks of dead and decaying trees and plants.

This view is thus forcibly expressed in a recent work* by Mr. Lionel S. Beale:—

“In various cases in which certain fungi do actually invade our tissues, the evidence of change in these last having occurred prior to the development of the fungi is sometimes so distinct, that, so far from the fungus attacking a healthy structure, and damaging it, the structure itself had deteriorated and changed or had undergone morbid derangement ere it was invaded.

“By decay it would appear that it had become converted into material adapted for the nutrition of the fungi, the growth of which had been effectually resisted as long as the tissues remained healthy. If this be so, the fungi cannot be regarded as the *cause* of the disease, any more than the vultures which devour the carcass of a dead man can be looked upon as the cause of his death.”

None the less weighty are the objections urged by Dr. Richardson of London in a recent address.

“The germ theory fails altogether to account for the immunity from recurrence of the communicable diseases, such as scarlet fever

* *Disease Germs.* L. S. Beale. London, 1870.

and smallpox, by virtue of a previous attack. Why cannot persistent organisms, which ever reproduce themselves in suitable soil, reoccupy the same soil, and live and reproduce there again? Can they not enter the body a second time? Or, entering it cannot they re-assert their activity? Can a man be charged with germs of smallpox or scarlet fever and remain unaffected by them? Again, if germs, capable of independent multiplication, are the cause of the diseases, why should there be recovery at all when once the body becomes infected? If the theory were true, then the body infected with organisms which, so long as they find a soil, are reproducible, should have no chance of recovery; for what is to prevent the continuance of the process of reproduction? But the facts are, that the majority of persons suffering from communicable diseases recover."

From the above quotations it will be seen that neither the vital nor the chemical or physical theory of the origin of communicable diseases is as yet satisfactorily demonstrated. Nor can either of these theories be accepted or rejected till additional investigations have increased our knowledge of the exact origin of microzymes. The problems to be solved are thus stated by Dr. Sanderson :—

"Do microzymes naturally exist as particles of living tissue, and thus take part not only in morbid processes, but in the performance of the normal functions, or are they originally morbid and imported into the body from without, being derived from the tissues or organs of other infected individuals, or produced by the transformation of the contents of the reproductive cells of the parasitic fungi inhabiting the higher plants?

"(a.) Is it true that the destructive parasites which inhabit the tissues of many of our common plants produce microzymes by a normal process of development?

"(b.) Are such microzymes respectively endowed with destructive morbid properties?

"(c.) Is it true that microzymes take part in any of the normal chemical functions, especially those which relate to the transformation of the albuminous compounds?

"(d.) Can they arise *de novo* in living tissues in mere consequence of impaired activity of nutrition?"

Meanwhile it must be acknowledged that there are very

strong grounds for inferring that the virus of charbon, like that of vaccine lymph and cow-pox, consists of minute organic matter of unknown origin which, under certain conditions, instead of undergoing chemical decomposition, is capable of preserving its activity outside the body and of being transferred as solid particles from place to place ; but, having been introduced into the blood, becomes developed and multiplied, and thus causes the characteristic symptoms.

This hypothesis, if accepted, is sufficient to enable us to explain how the disease may be communicated, and how, by the aid of certain chemical compounds, contagious matter may be neutralized or destroyed.

V.—METHODS AND SOURCES OF INFECTION.

While most writers have considered that in animals charbon may originate spontaneously, like intermittent fever in man, from miasmatic emanations, yet it has been established by repeated observations, that the districts in which the disease prevails as a epizootic, have not been characterized by any marked peculiarity either of climate or soil. On the contrary, it has been known to break out spontaneously in the most elevated regions as well as in marshy districts ; in cultivated as well as in uncultivated tracts ; in barns as well as in the open air.

M. Davaine, who has had unequalled facilities for investigating this disease in France, has undertaken to demonstrate that flies prove the chief source of the contagion, by sucking the blood of an infected animal and thence conveying the poison to others. Those insects, especially, which are armed with piercing probosces, seem qualified for transferring the poison in this way, but it is also possible that the wings and feet of ordinary flies may serve as rafts to convey the poisonous matter to the bodies of both animals and men.

But whatever may be the facts regarding the origin of the disease in animals, the great mass of testimony goes to prove that, in our race, the poison is exotic, being derived invariably from some of the lower animals, and the affection is most virulent when communicated by direct inoculation from horses and cattle, either during their life or shortly after their death. As the poison adhering to the various tissues of the animal is by no means destroyed when dried, or macerated in water, it is

not surprising that the persons most commonly affected with the disease are those whose occupation brings them in frequent contact with animals or animal remains, such, for example, as butchers, tanners, drovers, herdsmen, soap-boilers, manufacturers of glue, and workers in wool and horse-hair.

It is not essential that the poison should be deposited in a wound or on an excoriated surface, for experience has shown that a drop of blood or serum from a diseased animal, placed upon the skin, may in a short time cause the formation of a vesicle and the attendant symptoms.

Nothing can indicate more clearly the possible modes of infection than the report of the cases occurring in the practice of Dr. A. H. Smith* at Las Cruces, New Mexico:—

“Two men were engaged in skinning an animal which had died of the distemper. One of them had a pimple on the face which he had scratched with his nails till it bled. The other had received a scratch from a thorn in passing through the chaparral. The day was extremely warm, and the men frequently wiped the perspiration from their faces with their hands, covered, as they were, with the fluids from the animal. In a few hours vesicles were developed upon the abraded surfaces in both individuals.” * * * * “One case, occurring in the hand, made its appearance immediately after handling a number of dry hides.” * * * * “In another instance, the source of infection was a goat which, having the symptoms of the distemper, was killed, and the flesh eaten by the family. Although several persons ate the meat, that one alone was affected who prepared it for the table.”

Equally instructive are the cases reported by Dr. Pennock, occurring in Philadelphia. Here, one man, while engaged in skinning a cow that had died a few hours before, was bitten on the thumb by a mosquito. He scratched the bitten spot with the bloody fingers of the other hand, and four days afterward a vesicle was observed on this spot. Another man received a slight wound on his left hand while handling the same cow, and four days afterward a vesicle appeared on the spot of the incision.

Instances like these might be multiplied indefinitely, but the above are sufficient to illustrate how all objects which have

* Amer. Journal of Med. Sciences, Vol. LIII.

been in contact with the blood, hair or carcasses of diseased animals may be the means of communicating the disease to others.

They will also explain those singular cases recorded by Hildebrandt, in which dogs ate with impunity the flesh of animals which had died of charbon, but communicated the disease, by biting, to cattle and horses.

The question as to whether the flesh of animals that have died of charbon can be eaten with impunity has been discussed at length by those who have given this subject their attention. While numerous instances are on record in which the carcasses of diseased animals have been served to soldiers and others, in large quantities, without producing any bad results, exceptional cases are related by Fournier and Ammon,* where death quickly followed after eating such meat, although evidence is here wanting to show that this meat was thoroughly cooked.

Another not less interesting problem is whether charbon is transmissible from one human being to another, or whether the poison is exhausted in man, and here again the testimony of authorities is somewhat discordant. Thomassin† relates a case where a woman contracted the disease from direct contact with her husband, and similar instances are quoted by Fournier‡ and Stone,§ while Heilbach|| reports an instance where the malady was apparently communicated by a child to its mother.

It will be admitted, however, that these instances are of so very rare occurrence as to justify the conclusion that the danger of contagion from this source must be exceedingly small.

VI.—OBSERVATIONS ON THE EPIDEMIC AT WALPOLE.

If we turn now to the consideration of the disease as it has prevailed at Walpole it will appear that in August, 1853, a workman in a certain factory was taken suddenly ill, and died two days after, a well-marked characteristic vesicle having in the meanwhile appeared.

No other similar case is known to have occurred until April, 1861, when another man expired after an illness of twenty-four

* Unterricht über den Milzbrand, Ammon, p. 60.

† Thomassin. Diss. sur le charb. Malin., p. 31.

‡ Fournier. Observ. et Exper. sur le charb., Malin., p. 9.

§ Stone. Publications of the Mass. Med. Society, Vol. III., p. 84.

|| Heilbach, Diss. Inaug. de carb. malign. Berol., p. 16.

hours, having obscure symptoms of blood-poisoning, but without the appearance of any vesicle. Two months later, this was followed by another case, accompanied by a vesicle upon the neck.

These scattering cases attracted at that time but little attention, and the disease seems to have stopped here, without recurrence to any process of disinfection.

In March, 1866, another operative died, manifesting unmistakable symptoms of charbon, and from that time till July, 1869, the malady seems to have lurked about this same factory, indicating its presence at pretty regular intervals. During this period seven or eight cases have occurred each year, the average number of operatives employed being about eighty.

The following table (taken from the report of Dr. Stone) will indicate the total number of cases that have been observed up to the present time,* the particular varieties of the malady and the results:—

	Died.	Recovered.	Total.
Malignant Vesicle,	5	10	15
Internal Lesions,	8	2	10
Malignant Edema,	1	-	1
Total,	14	12	26

The annexed list shows the seat of the vesicles, which were invariably upon an exposed part:—

Neck,	6
Face,	5
Shoulder,	1
Nose,	1
Scalp,	1
Arm,	1

The malignant character of the malady will be appreciated when it is observed that of the fatal cases, five succumbed within twenty-four hours of the attack, in none of which, by the way, were any vesicles formed. If, now, we attempt to seek

* November, 1870.

the source of the contagion in these instances, we shall be at once struck by the fact that of the above twenty-six patients, twenty-four were employed in manufacturing curled hair. Of the other two, one was a carpenter who, a short time previous to his attack, had worked about the buildings connected with the factory, and the other was seized shortly after having nursed her husband who had been ill with the same malady. The fact that no other similar cases are known to have occurred in the town or in the State, and that in these the symptoms were nearly all unmistakable, lead to the conviction that the *materies morbi* was here introduced into the town through the medium of the hair employed in the factory.

This hair is sheared from the necks and tails of living wild horses, and is imported in bales, for the most part from Buenos Ayres, a small portion only being brought from Europe.

At the factory it is taken from the bales, picked apart by hand and sorted according to the quality and color, and then passed through a picking machine which separates the individual hairs and removes all foreign substances. It is next spun into ropes, boiled and finally dried in a heated compartment, by which the curl is set, and the ropes are now coiled and forwarded to the warehouse. During all these processes, the hands of the operatives are brought constantly in contact with the hair, while in the vicinity of the picking machine, the air is loaded with minute particles of dried animal matter, so that there is every facility for absorbing the poison by both contact and inhalation. There is a decided difference in the qualities of the hair imported, some specimens being quite clean, while others are often matted together with dirt and putrid animal matter.

Portions of this animal matter have been repeatedly introduced into the bodies of rabbits without producing any characteristic effects, and there are therefore no sufficient grounds for the belief that any of this unclean hair was charged with the virus of charbon, and the nature of the poison must, in the present state of our knowledge, render it impossible to distinguish hair that is thus infected from that of sound animals unless recourse is had to actual inoculations.

For a long while it was found difficult to convince many that the disease was in any way connected with the hair, and the

rarity of its occurrence, compared with the number of those exposed, was urged as an objection to this theory. To this, the obvious reply is, that the immunity of those who escape merely shows the susceptibility of the human race to contract the disease is small, and serves to illustrate one of the well-known laws of morbid poisons, viz.: "that many individuals are unsusceptible of their influence in the absence, at least, of peculiar predisposing causes." In hydrophobia, for instance, according to Hunter and Vaughan, only one out of twenty or thirty bitten by mad dogs contract the disease.

There are other and larger factories in New York, Philadelphia and Baltimore all of which obtain their supplies of hair from the very same sources.

When a cargo of hair arrives at New York, it is at once distributed among these different factories, and it has therefore been urged that it is somewhat remarkable, that, if large quantities of diseased hair were imported, all of it should have found its way to Walpole, and it is certain that the most careful inquiry has failed to discover a single instance of the disease or anything resembling it, in any other factory. Merchants employed in importing the hair in vessels to this country assert that no cases of the disease have ever occurred, to their knowledge, while, at the place of export in South America, persons have been known to be engaged for years in constantly handling the hair, without being aware of any bad effects therefrom. It must be remembered, however, that it is by no means necessary to assume that any very large amount of diseased hair has been imported, to account for the Walpole manifestations. We have already seen that the *materies morbi*, when dried may retain its activity for an indefinite period. Now throwing aside the three cases that occurred in 1851-1853, if we have reason to think that the hair of one affected animal was introduced into the factory at the beginning of the year 1866, it will be possible to account for the cases which have occurred since that time. We have only to suppose the morbid matter attached to the hair of one diseased horse to have entered the buildings at that time, and to have been scattered about the walls and floors by the process of manufacture; that it was afterwards stirred up from time to time and conveyed by means of the

hands or through the medium of the air to some portion of the body of an operative, and thus to have inoculated the disease.

This view will appear more plausible when it is considered that during this period, no efficient means were taken to disinfect the buildings, and that since a thorough disinfecting process was adopted, but one mild case of the disease has taken place, although a period of sixteen months has now elapsed.

As has been previously mentioned charbon is very seldom met with in the United States, so that there are but few instances on record where it has prevailed to any extent.

In the autumn of 1834, an epizootic of this nature broke out among cattle in and around Philadelphia, and the poison was communicated to several persons who had been engaged in skinning the dead bodies of these animals. Four of these cases, which occurred in the practice of Dr. C. W. Pennock were reported at length in the *Amer. Jour. Med. Sciences*.*

The same distemper appeared among cattle in the vicinity of Las Cruces, New Mexico, in the summer of 1865, and here, again, was communicated to quite a number of individuals, the mode of infection being in many instances demonstrated beyond a doubt. A very clear account of these cases, by Dr. A. H. Smith, will be found in the same journal.†

Dr. A. L. Pierson of Salem, states that the malady occurred formerly in that city every few years, generally among men engaged in unloading hides from vessels, or among curriers and tanners. He gives a brief account of five of these cases in one of the numbers of the *Boston Medical and Surgical Journal* for 1852,‡ one of which is here given :—

“On the 29th of October, 1850, I visited an Irishman of previous good health and temperate habits, with a sore on the chin, looking like an abrasion with a margin of vesication. He had left off his work as a journeyman currier the day before, on account of feeling unwell. The margin of the sore was very hard, purple and hot. The tumefaction and induration of cellular membrane rapidly extended, without the least abatement, during the five following days. The whole front of the neck became turgid, the eyes nearly closed, the cheeks and parotid glands distended, and at the period of death it had reached the clavicles. No suppuration evinced itself in any part of the swelling. The pulse grew fearfully rapid, the respira-

* Vol. XIX., p. 13, 1836.

† Vol. XXXIV., p. 481, 1867.

‡ Vol. XLVII., p. 75.

tion hurried, the heat of the skin was intense, the mind wandered on the last three days, and death took place on the fifth day of my attendance."

Some of the other cases reported by this gentleman would, I am inclined to think, be more properly included under the head of malignant carbuncle, a totally different affection.

Although other establishments in this country have fortunately not been visited with this malady, similar factories in Europe have not enjoyed the same immunity. Trousseau* narrates that in two French factories for working up horse-hair imported from South America, in which from six to eight hands were, on the average, employed, there were twenty deaths from charbon in the course of ten years.

In Chelius' System of Surgery,† a brief allusion is made to two similar cases occurring among operatives in a horse-hair manufactory.

VII.—ON THE VALUE AND APPLICATION OF DISINFECTANTS OR ANTISEPTICS.

We have already learned from the experiments of Beale, Hallier, Sanderson and Davaine what (for the present at least) may be assumed as the nature and properties of the poisonous element in charbon, and we are now the better prepared to consider the more practical part of the inquiry, viz.: whether the agents known as disinfectants and antiseptics really exert a decided and powerful action upon organic matter and vital phenomena.

This question is discussed by R. Angus Smith, F. R. S. and William Crookes, F. R. S., in their very elaborate and exhaustive report‡ on the cattle plague in England, giving the results of a series of careful experiments to demonstrate the comparative value of different disinfecting and antiseptic agents, such as chlorine, ozone, sulphurous acid and the tar acids.

The term "disinfectants" is meant to apply to those substances, which neutralize or destroy animal poisons by oxidation or some similar action. One of the most active and common disinfectants is heat. Clothing, wool, hair and similar sub-

* Gaz. Medic. 1847. Feb. No. 4.

† Vol. I, p. 69.

‡ Report from Commissioners; Cattle Plague. Vol. XXII, p. 187, London, 1866.

stances placed in boiling water half an hour become thoroughly disinfected, inasmuch as the vitality of all organic cells must in this way be destroyed.

“Antiseptics” include those agents which prevent chemical change by destroying the tendency to putrefy or ferment. Such is the action of carbolic acid in preserving meat.*

These experiments were made upon skins, hides, meat, yeast, air and infected matter, and some of the most decisive are here quoted.

“I. A few drops of carbolic acid, added to a half a pint of sugar syrup and yeast in full action immediately put a stop to fermentation.

“II. Fresh brewers’ yeast was washed with a solution of one per cent. of carbolic acid and then with water. Its power of inducing fermentation in solution of sugar was entirely destroyed, although no perceptible change in the appearance of the yeast-cells could be detected under the microscope. The experiment was repeated several times, and always with the same result, although when the yeast was simply washed in water, it readily induced fermentation.”

The above experiments prove conclusively that carbolic acid has a special action on the fermentation induced by organic matter; it not only arrests it instantly when in progress, but it prevents the development of future fermentation.

From still other experiments, it is demonstrated that carbolic acid acts, not as sulphurous acid is thought to do, by retarding oxidation through its affinity for oxygen, nor, on the other hand, does it possess the power of coagulating albumen. It must, therefore, be admitted that it attacks the vitality of organic substances in some manner which as yet remains unexplained.

The following illustrates the action of this substance (carbolic acid) on organic life.

“III. Cheese mites were immersed in water where they lay for several hours. A few drops of a solution of carbolic acid, containing one per cent. killed them instantly.

“IV. An aqueous solution of carbolic acid was added to water in which a small fish was swimming; it proved fatal in a few minutes.

* Antiseptics have been called also by Dr. Angus Smith “colytics” from *colleto*, I arrest.

"V. A very minute quantity of a weak solution of carbolic acid was added under the microscope to water containing various infusoria, such as bacteria, vibrious amœbæa; etc.

"The acid proved instantly fatal, arresting the movement of the animalcules at once. These animalcules are the almost invariable accompaniments of putrefactive fermentation.

"The above experiment has been tried with putrid blood, sour paste and decayed cheese, and in every instance, the destruction of vitality and the arrest of putrefaction have been simultaneous.

"VI. Caterpillars, beetles, crickets, fleas, moths and gnats were covered with a glass, the inside of which was smeared with carbolic acid. The vapor proved quickly fatal.

"It is also recorded by Dr. Lemaire that the vapor of carbolic acid will kill flies, ants and their eggs, lice, bugs, ticks, acari, and mosquitos and other insects of this size.

"VII. French experimentalists have repeatedly tested the influence on vaccine lymph of carbolic acid. They have employed lymph both pure, and mixed with a trace of carbolic acid. The vaccination with pure lymph was followed by the usual results, but in no instance was any effect produced by the lymph containing carbolic acid."

The following experiment tends to show a similarity between the action of vaccinal virus and that of the cattle plague.

The air from a close, highly infected shed, containing animals in the last stage of the disease, was drawn through glass tubes containing tufts of cotton wool, in the expectation that some of the virus cells supposed to be floating about in the air would be arrested by the wool. One piece of the infected wool was then exposed for half an hour to the vapor of carbolic acid. Two apparently healthy calves were then selected, and an incision being made beneath the skin, these pieces of wool were respectively inserted in each. The animal thus inoculated with the infected wool, which had been exposed to carbolic acid, remained perfectly well, but the other animal took the disease and died in a few days.*

"VIII. Experiments made upon farms in regions where the cattle plague was raging have afforded complete proof of carbolic disinfection. In some instances, the cattle upon properly disinfected

* As the plague was raging in the vicinity, it is possible that the calf which died did take the disease from the wool.—W. C.

farms have remained perfectly healthy, although whole herds were attacked and swept off upon farms a few hundred feet distant, which were not disinfected. •

“In other instances, where the plague had appeared upon a farm, and the premises were subsequently disinfected, the disease seems to have been suddenly arrested. It appeared, moreover, that when a plague did enter a disinfected shed, it lost, in a great measure, its virulence, and was deprived of its infectious character. In one instance, forty-five disinfected animals were turned out to grass, and at the same time removed from the protecting influence of carbolic acid. Within a few days, the plague attacked and killed the whole of them.”

After many practical trials, and a full consideration of the relative merits of the principal disinfectants, Mr. Crookes has concluded that,—

“Chlorine and ozone have the power of converting animal poisons into simple and innocuous substances by their property of oxidation. That the tar acids neither accelerate nor interrupt oxidation, but they act most powerfully in arresting all kinds of fermentative and putrefactive changes, and annihilate with the greatest certainty all the lower forms of animal life.”

“That the most powerful, and at the same time most simple, process of disinfection, applicable to living beings, as well as buildings, is to employ the *tar acids*,* as constant æriform and liquid disinfectants.”

The positive and satisfactory nature of these results indicates very clearly the importance of resorting at once to energetic measures of disinfection, whenever there is reason to suppose that any infected hair exists in a factory, like that at Walpole.

These measures may be briefly summarized as follows:

I. All suspected hair should be thoroughly disinfected, either by boiling for one-half hour, or by wetting with a solution of carbolic acid in proportions of two ounces to one gallon of water.

* The tar acids are known as carbolic and cresylic acids. Of these, carbolic acid, the most familiar, is a white crystalline solid, prepared from coal or wood tar, which becomes liquid when a small quantity, (5 per cent.) of water is added.

Pitch and other substances of which these acids form the active principle, have been employed from the most remote times as antiseptics, having been used by Egyptians in embalming mummies.

The former process is the one which has thus far been adopted by the proprietors of the Walpole factory, from the belief that it would be more efficacious. It has been found, however, that boiling the hair extracts a large proportion of the animal oil contained in it, thereby destroying its elasticity, rendering it more difficult to pick and spin, and causing considerable diminution in the weight.

It remains, therefore, to be decided whether on the whole, the application of the acid is not less expensive, and equally efficacious, since the weight of hair is not diminished by its use, nor its quality impaired. Furthermore, as the hair is invariably boiled in the latter stages of its manufacture, all odor left by the acid must thereby be removed.

II. The rooms to which the hair has been admitted should be thoroughly disinfected. The roofs and walls should be washed with lime. The floor and woodwork should be washed with water containing soda, and then sprinkled with a solution of carbolic acid. The clothing, boots and shoes of the operatives also demand attention, as the seeds of the disease may have attached themselves to some of these articles.

III. Those who are obliged to handle hair suspected of being infected should previously anoint their hands with a mixture of carbolic acid and lard, in the proportion of one drachm to the ounce.*

In the above observations no allusion has been made to the value of different remedies or modes of treatment, from the conviction that much more important results are to be obtained by the attempt to arrive at correct views of the nature and causes of the malady, and by anticipating its effects rather than by seeking to cure or mitigate them. It is gratifying to be able to report that the prophylactic measures carried out at Walpole have thus far been attended with satisfactory results. These results are confirmatory of the views of those who have paid most attention to sanitary questions, and afford proof that the labors of these men have been of very great advantage to mankind.

* A supply of this ointment is kept in constant readiness in the different apartments at the Walpole factory.

THE CAUSES
OF
TYPHOID FEVER IN MASSACHUSETTS.

AN INQUIRY INTO THE CAUSES OF TYPHOID FEVER, AS IT OCCURS IN MASSACHUSETTS.

It may be stated in round numbers that one person out of every thousand in Massachusetts, between the ages of five and seventy, dies yearly from typhoid fever. Excluding the extremes of youth and age within these limits, the proportion would be much larger. Reckoning the mortality at one in ten of those attacked, it seems very certain that more than one per cent. of the able-bodied adult population is rendered helpless every year from this disease, and for a period often extending through many months. Add to this the loss of time on the part of nurses and attendants, and it will be seen that the bread-winning efficiency of the people is impaired in a way which might be expressed in dollars, and it would certainly amount to a very large sum,—how large we do not pretend to estimate. Neither can we place in definite form the misery which the killing and wounding, from this cause, of so many persons in the prime of life, brings upon their kindred. The object of the present inquiry is to find out, if we can, whether all this loss and wretchedness is inevitable. If it shall appear that it is, either in whole or in part, avoidable, the information will be of value. The question is a difficult one and may not be completely answered at once, but by the collection of such evidence as now exists among us, we shall be brought nearer to its final solution.

We first seek to know where typhoid fever prevails; to learn something of its distribution; to compare different localities in a general way, and to find out in what towns or what class of towns it is most frequently present. Here we need a careful registration of sickness, but this is not to be had as yet, either in Massachusetts or in any other country. The time is coming when in some form or other it will be demanded and obtained.

The best we can now do is to estimate the prevalence of this disease, as of all others, by the official report of deaths. An epidemic of typhoid may have a fatality in certain years and under certain circumstances of season or place, which may vary from one in three to one in twenty ; but taking a series of years this element of error diminishes in force.

The disease may be called by a wrong name in the returns from the towns. This is certainly possible in some cases, but typhoid fever has very marked characters, and before death occurs, its nature can hardly fail to be recognized. No disease, except perhaps consumption, or the eruptive fevers, is less liable to be mistaken for others.

We do not wish to overstate the value of registration returns of the causes of death. They are certainly liable to error, but after much examination we believe them to be made with great care by trustworthy and intelligent men. The system of registration has now been in use in Massachusetts for thirty years, and has been constantly improving.

The information with regard to deaths from typhoid fever received through registration, is to be taken as the opinions of the town-clerks, based usually on the certificates of medical attendants, and, in their default, upon the declaration of surviving friends, and in rare cases upon common report.

The deaths from typhoid have always been classed with deaths from infantile fever, which latter term is vague and unsatisfactory. To eliminate this source of error, the death records of every town at the office of the State secretary have been searched for the ten years 1859–1868 inclusive, and the result is given in a table, showing the total and comparative mortality from typhoid fever, during this period, in persons over five years of age, in all parts of Massachusetts.

Another kind of evidence available in this inquiry, is that presented in the *opinions* of our correspondents all over the State, concerning the relation of cause and effect in typhoid fever as they have watched it. These opinions are full of interest and value. Discordant they surely are, and must necessarily be on a question of such obscure nature. Each judges from his own point of view, influenced by the varying circumstances of locality, opportunity, faith in the possibility of discovering causes, the character of his own mind.

And let no one imagine that, because physicians disagree, it is to their discredit as observers. How often do the twelve men of a jury entirely agree, even when direct visible proof is presented to them? How many engineers, or underwriters, or carpenters would entirely agree as to the causes of injury in a bridge, or a vessel, or a house, seeing only the destructive effects?

Yet the physician, in looking for the causes of disease in that most complex of all machines, the human body, is as yet but groping in the dimmest twilight. A century or two ago it might even have been thought irreverent to pry into these secrets of nature, and even yet there lingers in some minds a doubt as to the propriety of asking why we are sick.

The remote and essential causes of the phenomena which the physician witnesses in typhoid fever, are as yet almost completely hid from his eyes. He can only associate conditions of the most various sort with their apparent effects, and by a long series of such observations, be prepared to state his convictions concerning them.

It may be said of the questions addressed to our correspondents that they indicate preconceived opinions, that they are leading questions. To a certain extent this is true, and it could hardly be avoided. To bring out definite replies it was necessary to ask definite questions, but the evidence which we have received has been arranged to support no theory, but to establish truth. Whoever could present facts carefully observed, or professional opinions based upon general experience, has been welcomed in this inquiry, and his testimony is presented in the following pages.

The circular of May 1st, 1870, had two special objects:—1st. To obtain all information possible concerning the agency of filth in causing typhoid fever, either through the medium of air or of drinking-water; and 2d, to discover, if possible, whether the same relation exists between the height of subsoil water and epidemics of typhoid in Massachusetts as has been recently found at Munich in Bavaria.

Dr. Max Pettenkofer of Munich, a chemist and philosopher of world-wide repute, has made known of late, chiefly through the pages of the "*Zeitschrift für Biologie*," some views of the nature of cholera and typhoid fever, which are of singular interest.

His observations upon the first disease do not now concern us, but they led directly to the extension of the same ideas to the enteric fever of Munich, which may be regarded as identical with our typhoid. The subject has been still further elaborated, and at great length, by Dr. Bühl of Munich, and other followers of Pettenkofer. They contend, and, in so far as Munich is concerned, they demonstrate that epidemics of enteric fever stand in a fixed relation to certain obscure and as yet inexplicable changes in the soil, which changes are signalized by the fluctuations in the height of ground-water. The years of greatest mortality from enteric fever have been the years of lowest water-level; the years of least mortality, of highest water-level; and the variations between these extremes of mortality have coincided with the comparative depth at which water is found in the soil.

These observations have been made during the past fifteen years; and within that period the degree of danger from typhoid fever has been correctly indicated by the depth of water in the wells. Upon these and similar observations elsewhere in Germany, Dr. Pettenkofer and his followers have founded an hypothesis that the causes of typhoid are to be found in *the soil*, not in the water of the soil, which is regarded simply as an index, like the face of a clock, recording changes going on behind it; and that the fever-seed or germ is the result of "organic processes" taking place in the earth, and communicated to man through the medium of air. What these changes are, or in what the fever-germs consist, are unexplained.

These views have met with great opposition, and particularly in England, where belief in the contamination of drinking-water by animal excrement is very generally accepted as the chief cause of typhoid. The facts reported by Pettenkofer have been interpreted in England to mean that in a season of drought foul matters are retained in the loose soil, and that the area of drainage for each well is greatly increased by the subsidence of the ground-water level. In certain English towns the water level was permanently reduced by artificial drainage, while pure water was brought in from springs and streams for the use of the inhabitants, with a marked reduction in the mortality from typhoid.

Another and similar cause for fever is found by English writers in the washing of soluble filth from the loose soil into the wells by the first rain-fall after a drought.

Pettenkofer and his school do not deny the general importance of having drinking-water free from taint, but think that the artificial drainage of the English towns signifies no more in contradiction of the Munich experience as regards typhoid fever than the movement of the face of a clock by human hands would influence the rotation of the earth. Setting the soil-clock at typhoid will not cause the disease. Not until the soil is "typhoid-ripe" will that form of fever appear. Filth will foster and increase its virulence, but will not originate it. Pettenkofer believes that air coming from the soil (and not water) is the common vehicle of the typhoid poison, and he urges upon all who seek to know the causes of this disease to study the soil and the changes of character which it undergoes, not merely on the surface but at all depths above that at which water fills its pores.

Table of Deaths of Persons above five Years of age from Typhoid Fever in Massachusetts during Ten Years, 1859 to 1868, inclusive.

COUNTIES AND TOWNS,	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one death.	COUNTIES AND TOWNS.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one death.
<i>Barnstable County.</i>				<i>Berkshire—Con.</i>			
Barnstable, . . .	4,928	34	1,449	Lenox, . . .	1,660	22	754
Brewster, . . .	1,466	8	1,857	Monterey, . . .	737	15	491
Chatham, . . .	2,624	16	1,640	Mt. Washington, . . .	237	1	2,370
Dennis, . . .	3,592	43	835	New Ashford, . . .	178	1	1,780
Eastham, . . .	757	8	946	N. Marlborough, . . .	1,649	31	532
Falmouth, . . .	2,283	31	736	Otis, . . .	956	23	416
Harwich, . . .	3,540	57	621	Peru, . . .	494	6	823
Orleans, . . .	1,585	17	932	Pittsfield, . . .	9,676	93	1,040
Provincetown, . . .	3,472	18	1,929	Richmond, . . .	944	20	472
Sandwich, . . .	4,158	31	1,341	Sandisfield, . . .	1,411	26	542
Truro, . . .	1,447	9	1,608	Savoy, . . .	866	22	394
Wellfleet, . . .	2,296	15	1,530	Sheffield, . . .	2,459	69	356
Yarmouth, . . .	2,472	26	951	Stockbridge, . . .	1,967	28	702
<i>Berkshire County.</i>				Tyringham, . . .	650	9	722
Adams, . . .	8,298	111	7,475	Washington, . . .	859	9	954
Alford, . . .	461	3	1,537	W. Stockbridge, . . .	1,620	23	704
Becket, . . .	1,393	16	870	Williamstown, . . .	2,555	23	1,110
Cheshire, . . .	1,650	11	1,500	Windsor, . . .	753	5	1,506
Clarksburg, . . .	530	4	1,325	<i>Bristol County.</i>			
Dalton, . . .	1,137	22	517	Acushnet, . . .	1,251	14	893
Egremont, . . .	928	6	1,547	Attleborough, . . .	6,200	57	1,087
Florida, . . .	1,173	14	837	Berkley, . . .	847	9	941
Great Barrington, . . .	3,920	36	1,089	Dartmouth, . . .	3,435	29	1,184
Hancock, . . .	937	7	1,339	Dighton, . . .	1,813	11	1,648
Hinsdale, . . .	1,517	16	948	Easton, . . .	3,076	30	1,025
Lanesborough, . . .	1,294	4	3,235	Fairhaven, . . .	2,547	24	1,061
Lee, . . .	4,035	65	621	Fall River, . . .	17,451	136	1,286

Table of Deaths of Persons—Continued.

COUNTIES AND TOWNS.	Population 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.	COUNTIES AND TOWNS.	Population 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
<i>Bristol—Con.</i>				<i>Franklin—Con.</i>			
Freetown, . . .	1,485	9	1,650	Coleraine, . . .	1,798	23	750
Mansfield, . . .	2,130	15	1,420	Conway, . . .	1,538	21	732
New Bedford, . . .	20,853	162	1,287	Deerfield, . . .	3,038	40	759
Norton, . . .	1,709	23	743	Erving, . . .	576	8	720
Raynham, . . .	1,868	18	1,038	Gill, . . .	635	8	1,270
Rehoboth, . . .	1,843	18	1,024	Greenfield, . . .	3,211	56	573
Seekonk, . . .	928	3	3,093	Hawley, . . .	687	6	1,145
Somerset, . . .	1,789	13	1,376	Heath, . . .	642	4	1,605
Swansey, . . .	1,336	14	953	Leverett, . . .	914	19	481
Taunton, . . .	16,005	98	1,633	Leyden, . . .	592	5	1,184
Westport, . . .	2,799	33	848	Monroe, . . .	191	2	955
<i>Dukes County.</i>				Montague, . . .	1,574	21	750
Chilmark, . . .	548	3	1,827	New Salem, . . .	1,116	18	620
Edgartown, . . .	1,846	11	1,678	Northfield, . . .	1,660	26	639
Geenold, . . .	108	-	-	Orange, . . .	1,909	24	795
Tisbury, . . .	1,696	24	499	Rowe, . . .	563	6	936
<i>Essex County.</i>				Shelburne, . . .	1,654	20	827
Amesbury, . . .	4,181	28	1,493	Shutesbury, . . .	788	8	985
Andover, . . .	5,314	56	949	Sunderland, . . .	861	8	1,076
Beverly, . . .	5,942	68	874	Warwick, . . .	901	15	601
Boxford, . . .	868	12	723	Wendell, . . .	603	10	603
Bradford, . . .	1,566	15	1,044	Whateley, . . .	1,012	18	562
Danvers, . . .	5,144	46	1,118	<i>Hampden County.</i>			
Essex, . . .	1,630	23	735	Agawam, . . .	1,664	18	925
Georgetown, . . .	1,926	30	642	Blandford, . . .	1,087	25	435
Gloucester, . . .	11,937	94	1,270	Brimfield, . . .	1,316	13	1,012
Groveland, . . .	1,619	23	736	Chester, . . .	1,266	11	1,151
Hamilton, . . .	799	6	1,332	Chicopee, . . .	7,577	59	1,284
Haverhill, . . .	10,740	49	2,192	Granville, . . .	1,367	30	456
Ipswich, . . .	3,311	23	1,440	Holland, . . .	368	6	613
Lawrence, . . .	21,698	181	1,199	Holyoke, . . .	5,648	38	1,486
Lynn, . . .	20,747	188	1,104	Longmeadow, . . .	1,480	12	1,232
Lynnfield, . . .	725	5	1,450	Ludlow, . . .	1,232	23	536
Manchester, . . .	1,643	26	632	Montgomery, . . .	853	9	945
Marblehead, . . .	7,308	52	1,405	Palmer, . . .	3,080	32	969
Methuen, . . .	2,576	15	1,717	Russell, . . .	618	12	516
Middleton, . . .	922	10	922	Southwick, . . .	1,155	19	607
Nahant, . . .	313	2	1,565	Springfield, . . .	22,025	213	1,034
Newbury, . . .	1,362	23	592	Tolland, . . .	511	7	730
Newburyport, . . .	12,976	64	2,027	Wales, . . .	696	11	632
North Andover, . . .	2,622	33	795	Westfield, . . .	5,634	39	633
Peabody, . . .	6,051	27	2,241	West Springfield, . . .	2,100	22	954
Rockport, . . .	3,367	26	1,295	Wilbraham, . . .	2,111	42	503
Rowley, . . .	1,191	15	794	<i>Hampshire County.</i>			
Salem, . . .	21,189	126	1,682	Amherst, . . .	3,415	33	1,035
Salisbury, . . .	3,609	29	1,244	Belchertown, . . .	2,636	31	850
Saugus, . . .	2,006	11	1,824	Chesterfield, . . .	801	8	1,001
Swampscott, . . .	1,535	7	2,193	Cummington, . . .	980	12	817
Topsfield, . . .	1,212	16	757	Easthampton, . . .	2,869	37	775
Wenham, . . .	918	8	1,147	Enfield, . . .	997	19	525
West Newbury, . . .	2,087	22	949	Goshen, . . .	411	2	2,055
<i>Franklin County.</i>				Granby, . . .	908	13	698
Ashfield, . . .	1,221	12	1,017	Greenwich, . . .	648	9	720
Bernardston, . . .	902	15	601	Hadley, . . .	2,246	21	1,070
Buckland, . . .	1,922	26	739	Hatfield, . . .	1,405	15	937
Charlemont, . . .	994	9	1,104	Huntington, . . .	1,163	16	726
				Middlefield, . . .	727	6	1,216

Table of Deaths of Persons—Continued.

COUNTIES AND TOWNS.	Population 1965.	Deaths in 10 Years.	Average No. of persons living each year to one Death.	COUNTIES AND TOWNS.	Population 1965.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
<i>Hampshire—Con.</i>				<i>Middlesex—Con.</i>			
Northampton, . . .	7,925	87	911	Wayland, . . .	1,137	7	1,694
Pelham, . . .	737	8	931	Westford, . . .	1,568	26	603
Plainfield, . . .	579	12	482	Weston, . . .	1,231	8	1,539
Prescott, . . .	596	3	1,987	Wilmington, . . .	850	10	850
South Hadley, . . .	2,099	21	1,000	Winchester, . . .	1,968	4	4,920
Southampton, . . .	1,216	27	450	Woburn, . . .	6,999	58	1,207
Ware, . . .	3,374	46	733				
Westhampton, . . .	636	5	1,272	<i>Nantucket,</i>	4,748	33	1,439
Williamsburg, . . .	1,976	27	732				
Worthington, . . .	925	15	617	<i>Norfolk County.</i>			
<i>Middlesex County.</i>				Bellingham, . . .	1,240	7	1,771
Acton, . . .	1,660	14	1,186	Braintree, . . .	3,725	23	1,620
Arlington, . . .	2,760	13	2,133	Brookline, . . .	5,262	18	2,928
Ashby, . . .	1,080	20	540	Canton, . . .	3,318	18	2,562
Ashland, . . .	1,702	23	740	Cohasset, . . .	2,048	23	890
Bedford, . . .	820	13	631	Dedham, . . .	7,195	52	1,384
Belmont, . . .	1,279	9	6,395	Dorchester, . . .	10,717	53	2,092
Billerica, . . .	1,808	11	1,644	Dover, . . .	616	2	3,080
Boxborough, . . .	454	1	4,540	Foxborough, . . .	2,778	38	731
Brighton, . . .	3,854	19	2,038	Franklin, . . .	2,510	22	1,141
Burlington, . . .	594	5	1,188	Hyde Park,†	-	2	-
Cambridge, . . .	29,112	134	2,173	Medfield, . . .	1,012	8	1,265
Carlisle, . . .	642	5	1,284	Medway, . . .	3,219	30	1,078
Charlestown, . . .	26,399	154	1,714	Milton, . . .	2,770	27	1,036
Chelmsford, . . .	2,231	19	1,203	Needham, . . .	2,793	22	1,269
Concord, . . .	2,232	12	1,860	Quincy, . . .	6,718	41	1,639
Dracut, . . .	1,905	18	1,058	Randolph, . . .	5,734	37	1,550
Dunstable, . . .	533	2	2,665	Roxbury,‡	28,428	167	1,702
Framingham, . . .	4,665	36	1,296	Sharon, . . .	1,393	12	1,161
Groton, . . .	3,176	28	1,134	Stoughton, . . .	4,855	45	1,079
Holliston, . . .	3,125	26	1,202	Walpole, . . .	2,018	10	2,018
Hopkinton, . . .	4,132	26	1,589	West Roxbury, . . .	6,912	20	3,456
Hudson,*	-	12	-	Weymouth, . . .	7,975	41	1,945
Lexington, . . .	2,220	13	1,708	Wrentham, . . .	3,072	22	1,396
Lincoln, . . .	711	3	2,370	<i>Plymouth County.</i>			
Littleton, . . .	967	9	1,074	Abington, . . .	8,576	53	1,618
Lowell, . . .	30,990	191	1,623	Carver, . . .	1,059	18	588
Malden, . . .	6,840	55	1,244	Duxbury, . . .	2,384	20	1,192
Marlborough, . . .	7,164	45	1,592	E. Bridgewater, . . .	2,976	34	875
Medford, . . .	4,839	24	2,016	Halifax, . . .	722	15	481
Melrose, . . .	2,865	12	2,388	Hanover, . . .	1,545	15	1,030
Natick, . . .	5,208	46	1,132	Hanson, . . .	1,196	20	598
Newton, . . .	8,975	59	1,521	Hingham, . . .	4,176	15	2,784
North Reading, . . .	987	13	759	Hull, . . .	260	-	-
Pepperell, . . .	1,709	23	743	Kingston, . . .	1,626	13	1,261
Reading, . . .	2,436	18	1,355	Lakeville, . . .	1,110	15	740
Sherborn, . . .	1,049	10	1,049	Marion, . . .	960	19	505
Shirley, . . .	1,217	12	1,014	Marshfield, . . .	1,809	11	1,644
Somerville, . . .	9,353	40	2,338	Mattapoisett, . . .	1,451	19	764
Stoneham, . . .	3,298	29	1,137	Middleborough, . . .	4,565	49	932
Stow, . . .	1,537	18	854	N. Bridgewater, . . .	6,332	46	1,377
Sudbury, . . .	1,703	17	1,002	Pembroke, . . .	1,489	26	573
Townsend, . . .	2,042	30	681	Plymouth, . . .	6,068	41	1,480
Tyngsborough, . . .	578	5	1,156	Plympton, . . .	924	18	513
Wakefield, . . .	3,244	19	1,707	Rochester, . . .	1,156	13	889
Waltham, . . .	6,896	56	1,231	Scituate, . . .	2,269	15	1,512
Watertown, . . .	3,779	19	1,988				

* Three years only.

† One year only.

‡ Nine years only.

Table of Deaths of Persons—Concluded.

COUNTIES AND TOWNS.	Population 1865.	Deaths in 10 Years.	Average No. of persons living each year to one death.	COUNTIES AND TOWNS.	Population 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
<i>Plymouth—Con.</i>				<i>Worcester—Con.</i>			
South Scituate, .	1,635	17	962	Leominster, .	3,313	21	1,577
Wareham, . .	2,798	24	1,166	Lunenburg, .	1,167	12	972
W. Bridgewater, .	1,825	12	1,521	Mendon, . .	1,207	8	1,508
<i>Suffolk County.</i>				Millford, . .	9,108	64	1,423
Boston, (9 years,) .	192,318	949	2,026	Millbury, . .	3,780	29	1,304
Boston and Rox- bury, (1868,) .	220,744	122	1,809	New Braintree, .	752	9	835
Chelsea, . .	14,403	86	1,675	Northborough, .	1,623	10	1,623
North Chelsea, .	858	1	8,580	Northbridge, .	2,642	16	1,651
Winthrop, . .	633	3	2,110	N. Brookfield, .	2,514	27	931
<i>Worcester County.</i>				Oakham, . .	925	14	661
Ashburnham, .	2,153	29	742	Oxford, . .	2,713	22	1,233
Athol, . . .	2,814	30	938	Faxton, . .	626	13	482
Auburn, . .	959	16	599	Petersham, .	1,428	20	714
Barre, . . .	2,856	37	772	Phillipston, .	725	16	453
Berlin, . . .	1,061	20	530	Princeton, . .	1,239	15	826
Blackstone, .	4,857	32	1,518	Royalston, .	1,441	37	390
Bolton, . . .	1,502	31	485	Rutland, . .	1,011	9	1,123
Boylston, . .	792	5	1,584	Shrewsbury, .	1,570	20	785
Brookfield, .	2,101	21	1,000	Southborough, .	1,750	13	1,345
Charlton, . .	1,925	18	1,069	Southbridge, .	4,131	47	879
Clinton, . .	4,021	27	1,489	Spencer, . .	3,024	30	1,008
Dana, . . .	789	7	1,127	Sterling, . .	1,668	16	1,042
Douglas, . .	2,155	17	1,267	Sturbridge, .	1,993	16	1,246
Dudley, . .	2,076	41	506	Sutton, . .	2,363	30	787
Fitchburg, . .	8,118	86	944	Templeton, .	2,390	36	664
Gardner, . .	2,553	20	1,276	Upton, . . .	2,018	17	1,175
Grafton, . .	3,961	58	683	Uxbridge, . .	2,838	11	2,580
Hardwick, . .	1,967	9	2,185	Warren, . .	2,180	26	838
Harvard, . .	1,355	7	1,936	Webster, . .	3,608	62	582
Holden, . . .	1,846	11	1,678	Westborough, .	3,141	29	1,083
Hubbardston, .	1,546	31	499	West Boylston, .	2,294	30	765
Lancaster, . .	1,752	21	834	West Brookfield, .	1,549	31	500
Leicester, . .	2,527	15	1,685	Westminster, .	1,639	26	630
				Winchendon, .	2,801	26	1,077
				Worcester, . .	36,055	254	1,183

The first thing which strikes us on looking over this table is the apparently greater mortality from typhoid in the small towns. How great this difference is will appear from the following comparison :—

Table showing relative mortality for Ten Years from Typhoid Fever in persons above five years of age, in the larger and smaller Cities and Towns.

	Population 1905 (All Ages.)	Total Deaths from Typhoid in Ten Years.	Av'ge No. of persons living each year to one Death.	Av'ge No. of Deaths each year to 1,000 Per- sons living.
One hundred and forty-seven (147) cities and towns of more than 2,000 inhabitants,*	1,044,294	7,888	1,323.90	0.755
One hundred and eighty-four (184) towns of less than 2,000 inhab- itants,†	213,468	2,539	840.75	1.189

There can be no doubt that typhoid in Massachusetts, is a disease of scattered communities rather than of crowded towns, of rural rather than of urban districts. In spite of the smaller mortality from all causes, typhoid is more destructive in the farming towns than in the manufacturing towns and the large cities. This is an important fact in the study of the causes of the disease, and one which we shall have occasion again to refer.

Our circular of May 1st relating to typhoid fever asked four questions. Replies have been received from one hundred and sixty-three (163) towns. The replies are tabulated under each question.

1. Have you observed a difference in the prevalence of this disease between houses supplied with water from wells about the premises, and houses supplied with water conveyed from springs or from ponds of unquestionable purity?

Replies.

Yes,	23
No difference has been remarked,	71
Whole supply of town from wells,	18
Indefinite,	51

2. Can you inform us whether, at times when typhoid prevailed, the water of the wells was rising or falling, and whether it was higher or lower than the average for the year?

* Not including Monson and Bridgewater (State Almshouses), Hyde Park and Hudson.

† Not including Tewksbury (State Almshouse).

(If your attention has not been given to the height of subsoil water as marked by the wells, will you have the kindness to note it in future epidemics, and let us know the result?)

Replies.

Rising after being very low,	11
Falling,	16
Very low,	36
Have not observed,	100

3. Have you observed any connection between typhoid fever and foul soil, whether from privies, pigsties, manure heaps, or similar collections of decomposing matter lying on the ground?

Replies.

Yes,	79
No,	45
Doubtful,	39

4. Have you observed any connection between typhoid fever and putrid air, whether from rotting vegetables in cellars, bad drains, unventilated living or sleeping rooms, or from any other cause?

Replies.

Yes,	90
No,	36
Doubtful,	37

Ten towns report that typhoid fever is a disease almost unknown among them, and for this reason they can give no information.

The following are the replies on this interesting subject in the form of opinions based on professional experience, from our correspondents in the various towns.

Andover. "Something more than twenty years ago there appeared in one of the English medical journals an article written with much ability, the object of which was to show that the defective sewerage of London was the cause of a large amount of sickness. Statistics were given running through a series of years, showing that the mortality from *bowel complaints* and fevers had

been uniformly inversely to the amount of rainfall to wash out the sewers, particularly during the hot months. The statistics were of this kind. In the month of — from the 20th to the 30th there was no rain sufficient to wash out the sewers, and the mortality from these diseases was constantly increasing. On the 30th, a heavy rain, followed by a diminution of the mortality; but, as no more rain fell for the next twelve days, the mortality again increased till another rain, and so on.

"Some sixteen years ago I was mentioning this to a very intelligent and observing man and an old resident, who stated that the same had always been true in this town. My observation since that time has convinced me that he was entirely correct. The English writer's conclusions with regard to defective sewerage I cannot regard as proven. The statistics only go to show that the mortality from these diseases is inversely to the amount of rainfall. The less rain, the more typhoid fevers and other cognate diseases I apprehend is the rule or law the world over, not only in the cities but in the country also. But the fevers thus caused may not be developed until after more rain and the water in the wells is again rising. I believe that the law is not confined entirely to the summer season, and to fevers and bowel complaints, but is of more general application to nearly all (especially acute) diseases, and to all seasons of the year. Rain is undoubtedly the great purifier of the atmosphere from the causes of disease."

Our correspondent, in a subsequent letter states that from personal experience and observation in Siam he finds confirmation of the views above expressed.

Attleborough. "In localities where typhoid fever prevails, foul soil or foul air, under conditions corresponding to questions three and four, have almost always been detected. Still, I have seen some very striking instances of immunity from typhoid in positions where the pythogenic influences were conspicuous, and where the assumed fever producing elements must have existed in a concentrated form. In view of these exceptions, I have been compelled to think that there must be a preparatory receptivity in order to make the exciting influences noxious."

Amherst. "Typhoid fever is a common disease here. * * I have now in mind a house where, at one time, fever seemed endemic. The cause was found in decaying vegetables and filth in the cellar. These being removed, the disease disappeared."

Ashland. "The most unhealthy part of our village is not on the plain but is a street extending along the south side of a hill. During the past two years there have been cases of typhoid fever on this street quite out of proportion to the number of inhabitants. Two years ago this location was a piece of woodland. It was cleared, and ten tenement houses erected on it for the accommodation of twenty families. Soil, a gravelly loam resting on a gravelly subsoil and very rocky. The land is springy, and water stands in the cellars of these houses five or six months in the year. No pigsties; and privies five rods distant from the houses. Water from wells. From the land having been so recently cleared, there is much decaying vegetable matter on the ground and in the soil. The structural ventilation of these houses not more deficient than other houses of the village, but as there are no shade-trees, and the houses stand on the south side of the hill, and all the roofs are flat and covered with a black composition absorbing much heat, the air of the sleeping rooms in summer was exceedingly hot. We may say that the ventilation of the houses was virtually poor.

"We may consider the practical facts presented in this connection to be these: That quantities of decomposing matter, whether from pigsties, privies, vegetables in cellars, or *decomposing leaves of newly cleared land*, combined with *dampness* and *deficient ventilation* may be among the causes of typhoid fever; bearing in mind that the disease is propagated by contagion. Another thought worthy of notice is the question of the influence of the mind as a predisposing cause. All the inmates of these houses were strangers in town; families imported by the factory company from different parts of the country. Strangers in a strange land, away from all the sympathies of friends and neighbors, subject to all the emotions of home-sickness, depressed by the uncertainties of new undertakings, and constantly undergoing the fatigues of toil."

Athol. "Typhoid fever has not prevailed to any great extent during the past eight years. Most of the cases have occurred in a certain part of Athol proper. In this locality the land is very high, the soil cold, thin and marshy; no running water, no drainage. There is no known impurity in the well water. Connection has been traced in this locality between typhoid and foul soil and air.

"On the other hand, cases have occurred in various localities where no connection seemed to exist with these causes."

Ashburnham. Last autumn there were some thirty cases of typhoid in town; no cause recognized. Water mostly from springs.

Beverly.—Our correspondent reports ten cases of typhoid of a very severe type, occurring in one family, in November, 1865. The house stands near the ocean, but on a hill seventy feet above high-water mark. The hill slopes in every direction from the house, and is mostly rock. The house is built on rock, is large and airy. The cause of the fever was found in the following circumstances:—The privy was only about eight feet from the house and exceedingly foul. The sink spout ran into a hogshead, and the odor from this and the ground immediately about it was intensely putrid. Two families occupied the other end of the building, and no cases of fever occurred among them. About seventy persons acted as watchers and attendants upon the sick family, and not one took the disease. The weather before this outbreak of fever had been very wet, and, just previous, very hot and dry.

Berkley.—"There is one house where typhoid fever has been more prevalent than in any other in the town. Its situation is as follows: Soil dry, gravelly and sandy; on the south is a course of swamps with water sometimes a little stagnant; on the north is a deep pond-hole with some vegetation growing in it, quite near the house, and surrounded with hills on the north-east, north and north-west. When in the fall of the year the wind blows for some time from the north-east, over the woody hill and across the pond-hole, I expect typhoid fever in that house, and I have not often been mistaken. I have observed this for the past twenty-six years."

Brookline.—Our correspondent gives the result of his observations during twenty years of practice in this town. He writes as follows:—"By consulting the town records I find that during the ten years, 1860-1869 inclusive, there were but twenty deaths from typhoid fever. Of this number fifteen were in the class who live in well-built comfortable homes, and five in the crowded homes of the poorer and laboring classes. I have been unable to obtain the relative numbers of these two classes of our population, yet my experience has been that the poorer class has not been so liable to typhoid fever as the wealthier portion of the community.

"The larger proportion of typhoid cases which have been under my care in the fall of the year must be referred to epidemics or atmospheric influences existing in other towns where the subjects of the disease had been visiting. One fatal instance this autumn commenced ten days after the patient returned from Conway, N. H. Four individuals in one family had very severe typhoid, one at Nahant, and three after returning thence to Brookline. And

so with nearly all the cases I remember during the past six years. Although I believe in the necessity of careful drainage, I must say that I have never had cases that I could attribute to bad drainage, but many that I could trace to decaying vegetables in cellars.

"I have always supposed that moisture and heavy fogs had a great deal to do with the existence of typhoid fever, as it has been the scourge of towns in the vicinity of rivers and brooks, and where large extents of meadow land were uncovered by the heat and evaporations of summer.

"In 1846 or 1847 a serious and malignant epidemic of typhoid-dysentery raged on Bradlee's Hill, and in the houses in the vicinity of the reservoir, then in process of construction, in a locality which in other years had been healthy. At that time, I attributed the epidemic to the turning over and exposure to the air of the meadow mud filled with decaying roots and other vegetation. Something of the same kind occurred in Brighton, on breaking ground for the Brighton reservoir, but owing to the smaller number of houses in the neighborhood the epidemic was less noticeable.

"It is the custom in Brookline at this season to cover the grass and garden-beds around the houses with manure, often taken from the pigsty, filling the air with an intolerable stench. To be sure the frost soon checks decomposition, and the rains wash out the odor, yet we might expect this practice would excite disease, but I have not noticed any such result."

Boston.—The answer to the first question of the circular of May 1st, requires a comparison to be made, as regards typhoid fever, between the Boston of a quarter of a century ago, and the Boston of to-day. Previous to 1848 the water supply of the inhabitants was to a very limited extent from Jamaica Pond, but in by far the larger portions from wells. These wells were very numerous; almost as much so as the privy vaults with which they were in close proximity. After an extensive fire, such as frequently occurred at that time, the foul character of the soil drained by these wells was very evident. The water nevertheless was, although "hard," generally clear and sparkling, as is not unusual with water containing a large proportion of nitrates, the result of decomposition.

The water of Lake Cochituate was brought into Boston in the autumn of 1848, and was very soon received by the whole population. The wells were abandoned and filled up, or now only exist as receptacles for dirt and rubbish.

We have endeavored in various ways to ascertain the relative

frequency and severity of typhoid fever before and since the introduction of the unquestionably pure water of Lake Cochituate.

The following table gives the number of deaths for each year from 1846 to 1867, reported as from typhoid or typhus. Previous to 1846 no record was made.* We have therefore only the three years 1846, 1847 and 1848 to compare in statistical form with the nineteen subsequent years. Moreover, the year 1847 was marked by the importation of a great number of cases of true typhus, known here as "ship-fever," occurring among the immigrants arriving at this port.

It is unnecessary that the distinction made by physicians during the past thirty years between typhus and typhoid, should be enlarged upon in this connection, but it is important to remember that the two diseases were confounded by every one before that period, and that true typhus, although occasionally originating here, is a rare disease, while typhoid is exceedingly common. For our present purpose, with the exception of the ship-fever of 1847, the two forms of fever may be regarded as one. Our oldest physicians (while recognizing the differences, which have been perfectly defined) still speak of typhoid as typhus, and we wish to be understood as classing together these two nearly related forms of continued fever.

With this explanation, the following table may be taken as a close approximation to the truth with regard to mortality from typhoid fever in Boston :—

* Since the above was written we have seen an old record of deaths and their causes in Boston for nearly every year, from 1825 to 1846, which is preserved at the office of the City Registrar. Although this record is too imperfect for use in statistical form, it seems right to say that it gives the impression that while typhoid fever was somewhat more fatal, and therefore probably of more frequent occurrence, in those years than at the present time, it would be wrong to suppose that the death-rates, which prevailed in 1847 and 1848 were the rule previous to the introduction of pure water. Those were exceptional years in so far as we can discover, and the great mortality from fever was due in part at least to the importation of foreigners who brought disease with them.

*Table of Deaths from Typhoid and Typhus Fever in Boston,
1846–1867,*

(Previous to the Annexation of Roxbury.)

Y E A R.	Typhoid.	Typhus.	Totals
1846,	—	133*	133
1847,	—	666*†	666
1848,	—	288*	288
1849,	80‡	119	149
1850,	43	61	104
1851,	82	88	170
1852,	66	46	110
1853,	67	44	111
1854,	64	38	102
1855,	78	12	90
1856,	70	6	76
1857,	83	3	86
1858,	78	2	75
1859,	85‡	—	85
1860,	—	110§	110
1861,	—	96§	96
1862,	74‡	—	74
1863,	180‡	—	180
1864,	107	10	117
1865,	125	12	137
1866,	93	8	101
1867,	88	3	91

* Reported in First Annual Report of Registrar (1849), taken from previous records.

† Includes 366 deaths from ship-fever at Deer Island, City Poor-House and House of Industry.

‡ Typhoid and typhus together.

§ Note to Annual State Registration Report for 1849:—"This county (Suffolk) was never complete till 1849, the city of Boston never having complied with the law prior to that time."

¶ Taken from State Registration Reports for 1860 and 1861, no municipal report of the Registrar having been made in those years. The figures for these two years include all of Suffolk County, and also include "cases of infantile fever classed with those of typhoid, relapsing and other continued fevers under one name—typhus."

Table of Deaths from Typhoid Fever in Boston, compared with a fixed number of the living in each year.

Y E A R.	Population.	Deaths.	Deaths to 10,000 living.
1846,	116,865	133	11.4
1847,	122,346	300	24.5
1848,	127,827	288	22.5
1849,	133,308	149	11.2
1850,	138,788	104	7.5
1851,	142,693	170	11.9
1852,	146,598	110	7.5
1853,	150,503	111	7.4
1854,	154,408	102	6.6
1855,	158,313	90	5.7
1856,	162,218	76	4.7
1857,	166,123	86	5.2
1858,	170,028	75	4.4
1859,	173,934	85	4.9
1860,	177,840	110	6.2
1861,	180,735	96	5.3
1862,	183,630	74	4.0
1863,	186,526	130	6.9
1864,	189,422	117	6.2
1865,	192,318	137	7.1
1866,	195,214	101	5.2
1867,	198,110	91	4.6

An examination of these tables shows that typhoid fever is less fatal now than when the registration of the causes of death was commenced, and it shows a very marked diminution in the number of deaths in the years following an abundant supply of pure water. This may be attributed not only to the improved character of the drinking-water used by the people, but also to the constant flushing of the drains and sewers, by which much material which had previously been retained there in a state of putrescence, particularly during seasons without rain, was washed into the sea.

But the statistical evidence is not all which goes to prove the effect of Cochituate water on typhoid fever in Boston.

Inquiry has been made of our oldest physicians for their opinions on this point, based upon professional experience. Their testimony is almost unanimously to the effect that since the period when pure water was introduced, typhoid fever has been less frequent and less severe. The following extracts from the reply of a gentleman whose professional experience extends over a period of fifty-five years will be read with interest:—

"I have noticed since the time when Cochituate water was introduced that typhoid fever has been less frequent in proportion to the population, and generally mitigated in its character. * * * * * At the early part of my professional life, fever of a severe type was quite common, much more so than it was a few years later, and the cases were of a more serious character than at any subsequent period. * * * * * Cases of what is now distinctly recognized as 'typhus' were not then uncommon; they are now comparatively rare. Mild cases of 'typhoid' fever, such as have of late been most common, do not readily arise to the remembrance of the practitioner of that early time. * * * * * From the period referred to down to the time of the introduction of Cochituate water, fevers had still been gradually lessening in frequency and severity. It has been noticed that since the introduction of pure water the diminution of typhoid fever, both in frequency and virulence, has been still more marked."

How much of this improvement is due to better drinking-water, and how much to the better drains and sewers, how much to the free supply of water to wash away impurities, how much to the more rational treatment of fevers, our correspondent thinks may not be determined; but,

"Taking into view the fact that fevers have become comparatively less frequent, and much mitigated in severity since the introduction of pure water, the inference is just that much of the benefit derived is due to this cause."

With regard to the second inquiry of the typhoid circular, we are unable to answer with precision. Wells being disused in Boston, the height of water in the soil is not as readily ascertained as in the country.

The extension of land over the sea which has been going on in Boston for many years has been attended with a contest between the waters of the land and the waters of the sea for possession of the subsoil, a contest in which fresh water speedily triumphs. Soon after the filling is made the water is salt, then brackish, and, in a few months, fresh.

This has been the case wherever the filling has been made with porous material. The pressure of rain-water received upon the surface of the new-made land, combined with that flowing down from more elevated points, is evidently greater than the pressure of the water of the ocean, so that we meet even now on the gravel-filled territory south and west of the Public Garden with fresh water below the level of the tide, just as is described by our correspondents of Cape Cod and Martha's Vineyard.

The reply to be made to the third and fourth questions of the circular of May 1st, must be that in Boston the ordinary collections of filth found in crowded localities, in dirty houses, in foul privies

and stables and streets and alleys,—the combination of all those impurities which make Boston stink in the month of August, does not especially invite epidemics of fever. The city is more free from typhoid than the country. We have to pay the penalty (and a heavy one it is) in other forms of disease, but not in this.

A very considerable number of the cases of typhoid treated in Boston during the autumn originate in the country and at seaside places where families from the city have passed the summer.

We cannot assume to fully explain the comparative exemption of Boston from typhoid, but there are some things in this connection which, whether they are causes or coincidences, it is well to remember.

The drinking-water is, beyond all question, free from contamination by putrefying material. The soil is well covered by pavement, or by macadamized streets, or thoroughly packed gravel, and is not often disturbed to any great extent.

People do not live in large numbers on the ground floor; a very great majority sleep in rooms twenty feet at least above the ground. Cellars are very seldom used for the storage of vegetables. Piggsties are unknown. Drains and sewers receive the liquid slops of the kitchen and convey them to the sea. Liquid filth is not often poured upon the ground.

The older parts of Boston are more filthy from overflowing, neglected and broken privy-vaults, than any country place can possibly be; but they do not contaminate the drinking-water.

The influence of obstructed drains and of emanations from untrapped sinks and water-closets is as evident in Boston as elsewhere. In Kearsarge Avenue, Boston Highlands, is a block of three brick houses, built seven years ago. They are situated on the slope of a hill, with good natural facilities for drainage. The neighborhood is an excellent one. In these three houses there occurred in the autumn of 1868 eleven cases of typhoid fever; and in the adjacent houses, whose rear came against the block, there were two cases.

Of the thirteen cases, two were fatal. One of the attending physicians states that at his suggestion the common sewer of the block, which was laid along the rear of the houses and into which the drains of the houses emptied, was examined. It was found to be effectually obstructed by a mass of rubbish, including crockery, tinware and ashes, so that the fluids accumulating above this plug had over-flowed, saturating the ground beneath the houses and infecting also in some degree the soil beneath the adjacent block. The workmen engaged in taking up the drain and repairing it were nauseated and were obliged to desist at intervals from their work.

The physician stated further that the typhoid epidemic in that neighborhood subsided soon after the nuisance was abated.

The following history of a single case of typhoid fever has been furnished for publication at our request, by an eminent practitioner. Although not referring directly to the special object of this inquiry, it throws so strong a reflected light upon the causes of disease, and is itself so striking an example of the value of hygienic treatment, that we cannot doubt the propriety of reporting it in this connection:—

“A young and apparently vigorous man, between twenty and thirty years of age, a butcher by trade, was attacked with typhoid fever in the autumn of a few years ago. I saw him soon after the fever commenced, and attended him through the whole of it. He was a bachelor and occupied a good sized chamber in the second story of a house in Pleasant Street. The chamber was lighted by two windows, and furnished with an open fire-place in a chimney.

“The fever was a mild but unmistakable typhoid, which developed itself normally. The patient had a daily febrile exacerbation, a hot skin, thirst, a slight diarrhoea, rose-spots and the like. There were no violent symptoms, and consequently no indications for active treatment. In fact I saw no reason for the exhibition of drugs, and therefore gave none. His skin was bathed two or three times a day with tepid water. A slight wood fire, just enough to insure ventilation, was kept in the chimney of his chamber, and one of the windows raised a little. He was allowed to drink as much water as he chose, iced or not according to his taste. In like manner the covering of his body was regulated by his sensations; when hot he had only a sheet over him, at other times he required a light blanket.

“As soon as the fever was sufficiently developed to render its character clear I advised his landlady to inform his family, who resided at a distance from the city in Vermont or New Hampshire I think, of his illness, and to add that he was not dangerously ill.

“Directly the news reached his family a maiden aunt and sister were despatched to the city to take care of him. Alarmed by the name, typhoid fever, they hurried to Boston and reached his quarters one forenoon, just after I had made my customary visit. My patient was in the condition described above, comfortably sick, with a pulse of about eighty and without delirium. They were frightened and astonished to find their relative, who was sick with typhoid fever, so poorly cared for. Guided by their theory of the proper treatment of fever, they proceeded without informing me to reform matters.

“They pinned a blanket over each window so as to exclude the light, and closed the open window so as to shut out the noise of the street. A fire-board, or chimney-board I believe it is called, which had been removed from the fire-place was replaced, and an ‘air-tight’ stove, in which a fire was built, was substituted for the open fire. In order to make him sweat he was packed in two or three blankets, and the diaphoretic process encouraged by copious libations of herb tea. The fact that no medicines were given they regarded as an unpardonable neglect on the part of the attending physician,

but until they saw me were content to make up for this neglect by giving the hot teas just referred to.

"When I reached the house on the next day for the purpose of visiting my patient I was met at the door by the landlady who informed me that he was much worse. She gave me no hint, however, of the transformation in his surroundings that had taken place. I went up stairs and was surprised beyond measure at the change. I found a dark room, filled with a hot and foul atmosphere. The odor was of that offensive sort that the chambers of the sick are too often charged with. But the greatest change was in the sick man whom I had left so comfortable the day before. He was wrapped in blankets, his skin was dry and very hot, his tongue dry, his lip cracked, his eye wild, his pulse one hundred and twenty, and he was so restless and delirious that it was all his attendants could do to keep him in bed.

"The maiden aunt approached me and introduced herself and niece. She said she came to nurse her nephew, and had found him with open windows, exposed to noise and currents of air, drinking cold water as freely as he chose, and taking no medicine. These evils she had endeavored to remedy, but in spite of all her efforts he had grown rapidly worse. She said this with such downright honesty and sincere simplicity that I could not be provoked with her. I asked her to step into an adjoining room, and told her that unless everything about her nephew was arranged just as it was before she came, I should take no further care of him. As she hesitated a moment, I added, 'he will probably die left as he is, and it is for you to take the responsibility of following your own course or mine.' We returned to the sick-chamber. I remained and saw her with trembling hands and doubtful looks remove the blankets from the windows and from the bed. The air-tight stove and the chimney-board were taken away. A fire was built in the chimney and a window opened. I gave the sick man a tumbler of water, which he drank as if he were quenching an internal fire. All this they bore in silence, but when I called for a large tub, and made preparations for a bath, they remonstrated. A bath, and particularly a cold bath, would kill him.

"Remonstrances were unavailing, and they were compelled to acquiesce. My patient got a cool affusion by pouring water all over him. He was then put to bed, lightly covered, and soon went to sleep. By night his condition had considerably improved, and on the next day, twenty-four hours later, his fever assumed its previous mild type. His pulse was about eighty, and his head tolerably clear. He made a satisfactory convalescence. His relatives returned home in due time, and if they are alive I hope they are the apostles of a rational treatment of typhoid fever."

Brimfield.—An experience of twenty years has satisfied our correspondent that the most prolific sources of typhoid fever are found in the conditions mentioned in the third and fourth questions. "Many and many a time" he has traced such connections.

"We have every year a few cases of typhoid fever, and in nearly every family where it has occurred in the past three or four years, I have thought it originated from decaying vegetable matter."

Bridgewater.—"Whenever I have had several cases of typhoid fever in one house or neighborhood I have usually found what I considered the cause; either a wet cellar with decaying vegetables, or a sink-drain running into a pool near the house for the purpose of making compost."

Brewster.—"Typhoid fever has in some instances seemed to be caused by bad drains, but in my opinion by far the most fruitful cause has been the emanations from low, wet, swampy grounds, and fresh-water ponds, of which the bottoms were partially exposed from evaporation in dry seasons."

Cambridge.—"I have not been able in the cases of typhoid fever I have seen to trace any connection between this disease and impurity of water, of soil or of air. I have seen the disease alike in the dwellings of the rich and of the poor, of the clean and of the filthy, in wet and in dry places. The only endemic of typhoid fever which we have ever had occurred some twenty years ago, and the cases were almost exclusively on the comparatively high land between Cambridgeport and Old Cambridge, in families provided with the comforts and, a large part of them, with the luxuries of life, in houses comparatively well ventilated, and containing nothing so far as could be discovered, to render the air impure."

Chatham.—"This town is situated at the heel of the Cape on a peninsula almost devoid of trees, and is almost continually swept by the wind. We have very few cases of typhoid, and those of a mild type. The disease is much more prevalent in East Harwich where my practice extends. That locality is well wooded, and there is much more fresh water. While practising in Wareham (head of Buzzard's Bay), I noticed the same peculiarity, which strikes me as being more than a coincidence. Most of the typhoid cases were in the adjoining town of Carver, which is interior, and where there is much fresh water and low meadow land; Wareham being unlike it in these respects."

Conway.—"According to my observation, *putrid air* from decaying vegetable matter and foul sink-drains, with poorly ventilated sleeping room, constitute the most frequent cause of typhoid fever."

Chester.—"Typhoid fever prevailed here constantly in 1858 and 1859 without regard to water or weather."

Concord.—"In two epidemics of typhoid, soil in the immediate vicinity of the cases was broken for the first time, and exposed to a hot and dry air in a season of drought. In one instance, in making a railroad a knoll was cut through and the dry, gravelly soil was carried forward to fill a depression by the side of a street occupied by several good houses. The work was done in the winter and spring. The subsequent autumn was dry and hot and the springs very low; fever occurred in nearly every house—from two to five cases.

"In another instance extensive stone quarries had been laid open, and large quantities of earth exposed for the first time. The wells were very low so that it was difficult to obtain water. In August, September and October following, many of the workmen, mostly stout men from the country, were affected with severe typhoid. I had ten cases at one time, some lasting six weeks, but all recovered."

Coleraine.—"I have failed in most cases, but not always, to observe the connection referred to in question 3.

"With regard to question 4, negligence in these respects, is common among the rural population; but often the most negligent families seem to escape. Still I have often found such carelessness in infected families. I think the bottoms of mill-ponds in times of drought are fertile sources of typhoid fever."

[NOTE.—See also "Health of Towns."]

Dartmouth.—"My experience is that typhoid fever prevails in its most malignant form in low, damp places, where rooms are but poorly ventilated, where cellars are overflowed, where drains are bad, and where decaying animal and vegetable matter is found in and around the building."

Dennis.—"In eighteen years' practice I have met with many cases of typhoid. They have generally been imported. For instance, a father, who is master of a vessel, comes home with typhoid fever, and there is a pretty good chance for it to go through the family, let the subsoil water be high or low.

"In a neighboring town I have seen well marked instances of typhoid caused by partially draining a swamp.

"Our people every year put fish under corn-hills, and it makes a most dreadful fetor for about ten days, but no disease results therefrom to my knowledge."

Dudley.—Our correspondent has observed an apparent connection between wet cellars and the habit of sleeping on the ground floor, and the origin of typhoid fever.

Erving.—“Last August three persons in one house died of typhoid fever. The cause seemed to be a pool of stagnant water and decaying vegetable matter within thirty feet of the house.”

Essex.—Typhoid fever was prevalent here in the summer and autumn of 1869, but no cause could be distinctly traced.

Fall River.—“In the autumn of 1867, about forty cases of typhoid fever occurred in one locality where a large number of houses had been recently built, and filled with French Canadians as soon as completed. The water was from wells just dug. Every form of filth was thrown on the ground, and left exposed. This locality is now well sewered and is as free from disease as any part of Fall River.

“The following year a large number of cases of fever occurred in another neighborhood. Here also the houses and wells were new. An examination of the premises showed that the pipe leading to vaults containing refuse matter and filth of all kinds, was so arranged as to allow the foul air to escape directly into the houses. These pipes were properly trapped, and no cases of typhoid have since occurred.

“In both years referred to (1867 and 1868) the typhoid fever in town was confined almost wholly to new comers, to the French recently from Canada.”

Franklin.—“We have but little typhoid fever. What seems strange to me is the fact that I see so many places where the sink water is deposited at the back door, and no apparent evil results follow. On the other hand I have had cases in families where the surroundings seemed conducive to health. I remember one instance six or eight years ago in which three families, comprising about sixteen persons were affected. Of this number twelve had the fever. The fathers of these families were brothers and lived quite near each other. I could discover no local causes. Those who were in the sick-rooms during the night took the fever, while a man-nurse, who remained only during the day, escaped. It was cold weather, but the nurse kept the windows open while he was in the house. These families had been previously well, and have continued well ever since, living in the same houses and with the same surroundings.”

Fitchburg.—Water from wells in the valley occupied by this town is believed to be deteriorating from the increase of population, but no connection with typhoid is remarked by our correspondent. "An epidemic of typho-bilious fever occurred in 1865 when our wells were very low and continued till the November rains of that year." Soil, very variable in different localities,—some clay bottoms, some gravel, a good deal of rock, very little alluvial soil. "The Nashua River makes a serpentine course of ten or eleven miles in crossing the town which is six miles wide. My experience of thirty-two years in this region leads me to believe that we have more of typhoid fever on the high land or on the *summits between the water-sheds*, than in valleys or low lands."

Great Barrington.—"Whenever called to a case of typhoid fever, I have been able to trace the origin to some local cause in every instance." The above opinion is the result of twenty years' practice. Our correspondent is very decided in the expression of his opinion that foul soil and air and water are the causes of typhoid fever.

Grafton.—Our correspondent finds no difference as regards the causes of fever between the water of springs or wells and other sources, provided the water be of good quality, but remarks, what others have also observed, that patients suffering from typhoid often manifest a singular longing for the water of springs or wells in the vicinity of a former residence.

"I have noticed that a connection between typhoid fever and foul soil seems to exist; occurring more generally and assuming a more grave and malignant type under these circumstances, sometimes seizing a whole family, or even many families in a neighborhood, until the cause was abated. Many cases, not only of typhoid, but of dysentery (the latter, perhaps, especially,) have originated in foul soil and putrid air within the range of my practice."

Gloucester.—"I have always found typhoid fever most prevalent and malignant where the air has been rendered impure from the causes enumerated in the fourth question of the typhoid circular." [See also "Health of Towns."]

Hadley.—"Some twenty years ago I attended upon a family consisting of a father, mother and nine children. The mother and eight children had typhoid fever. After the first case of fever, four of the children, who showed no signs of illness, were placed in

as many different families, three of them being at a distance of two or more miles from their home. They, however, exhibited signs of the disease as soon as those remaining at home. As to the cause,—there was a slaughter-house at the distance of one-third of a mile from the house. The proprietor had spread the accumulation of his hog-yard with the butchers' offal upon a low, wet piece of ground lying between his buildings and the house of his neighbor. Whenever the north-west wind blew, the stench was perceptible to all in the vicinity. I noticed it many times in riding by. I have always believed that the fever must be attributed to the influences proceeding from the manured field above mentioned.

"Thirty years ago, a clergyman built a house in this town, with a fine cellar extending under all portions of it. He dug a well under the L portion. The well was not covered, and consequently the floors of all the lower story were kept damp by evaporation. The sink-pipe ran down near the pump into a wooden spout, which passed under ground to a closed box, situated about fifteen feet from the cellar wall. The foul air from the box and drain had no means of escape, excepting through the drain back into the cellar. The cellar was also used for the storage of whatever vegetables were used in the family. The windows of the cellar were never taken out. There was no escape for the moisture and foul air, except by permeating the floors. Water stood in drops upon all the timbers and boards.

"After a few months' residence in the house, the minister's wife died, of fever so far as I can learn. He soon married again, and within one year of the death of the first wife, the second died from, as I understand, the same disease. His children were also sick. He lived in the house about two years. The next occupant was a man named B—. His wife was desperately sick. A physician then took the house. He married, and his wife died of the fever. Another physician was the next occupant, and he, within a few months, came near dying of erysipelas. All this while matters had remained as before described, with reference to ventilation. A school teacher then rented the house, and tore up the closed box, but did not cover the well. This was about eight years after the building of the house. The sickness and fatality were so marked, that the property became unsalable. When last sold, every sort of prediction was made as to the risk of occupancy, but by a thorough attention to sanitary conditions, no such risks have been encountered.

"For the following circumstances, I take popular statements as the only evidence available. In North Hadley is an extensive mill-

pond. About thirty years ago the water was drained off to make repairs during the summer. It had islands and many shallow places, on which there was a rank vegetable growth. There was consequently much decaying material from the exposure. Typhoid fever swept through the village, causing great mortality. No one here has ever questioned the fact that the draining of the pond was the cause.

"It is a fact, that within forty or fifty years, many ponds have been permanently dried up in the roads, and instead of there being a frog-pond in every farm-yard, there are now almost none. The drainage is greatly improved, land better cultivated, and sanitary laws better understood and acted upon.

"In those days the 'fall fever,' as it was called (really typhoid), was the dread of the people. One fall is spoken of in which there were twenty-two deaths from this cause, in an area of territory occupied probably by not more than twelve hundred people. Dysentery of a very fatal type was also a very common disease. Typhoid fever is now comparatively rare."

Holyoke.—"In the fall of 1869 cases of typhoid were quite numerous, but the disease prevailed in a greater or less degree through this entire valley, and could be traced to no special cause or causes. This year (1870) only three cases have come under my own observation. They were persons of exemplary habits, lived in the most healthy parts of the town, remote from each other, and I confess myself at a loss to know why they should have been ill at all."

Harwich.—"In this town the condition of some seventy-five to a hundred acres of territory lying south of and in close proximity to the principal village, has been the subject of much discussion. It was formerly covered with water to a depth of several feet, and known as "Grassy Pond." Of late it has been almost completely drained during a part of the year, for the cultivation of cranberries, to which use about one-third of it is now devoted, the remaining two-thirds being covered with rank grass. A ditch and many holes remain, partially filled with water. [This place was visited by the Secretary July 25th, 1870, at the request of the selectmen of Harwich.]

Our correspondent says of this place and its effects on those dwelling on its borders: "I have always freely expressed my opinion with regard to the cause of the sickness in the neighborhood of 'Grassy Pond.' It is due to the decomposition of vegetable and animal matter. My attention was called to it some ten

or fifteen years ago, when the cranberry culture commenced, and when the pond was partially drained. Since that time sickness has, on the whole, increased in this vicinity, though not in every year. In 1863, there were about forty cases of typhoid dysentery within one mile of the pond, on the northerly side, including in the area, I should judge, not more than thirty or forty families. At that time not a case of the kind occurred in any other section of the town."

Another physician of the town has given similar testimony.

Huntington.—Our correspondent states that typhoid fever is a very frequent disease, and is decided in the expression of his opinion that it may very commonly be traced to some local foulness as the cause. "In the winter of 1868 I attended six cases of typhoid in one house, on high and dry ground with good cellar and good water. I found no privy. The family for two years had made use of the vacant lot in the rear of the house. No other cause for the disease was found; this seemed sufficient."

In a subsequent letter it is stated that "persons coming here from other places have seemed most sure to have the fever, unless protected by a previous attack; from this I judge that there is some local cause operating here. Our village is low. Two large streams (the south and west branches of the Westfield River) pass through it. The fever, however, seems equally prevalent on the hills for miles around as in the valley. The autumn and winter of 1868 gave me fifty cases, about equally divided between the villages, and the country five miles around. I have usually found, on close investigation, some immediate and direct local cause on or about the premises. Our cellars are many of them damp, sinks foul, and the people blind to the importance of these things. In 1867, in one house where there were nine cases of severe fever, a drainage from a wet-sink, into which all the slops were thrown, had established itself to the well from which the water for drinking and cooking was obtained. In nearly every case some local cause was ascertained, in some instances apparently slight.'

Hingham.—Typhoid fever is a disease of very rare occurrence in this town.

Hudson.—"We had a great number of cases of typhoid fever and typhoid dysentery six years ago, caused, as I suppose, by the decaying vegetable matter from a pond in the village, which was drawn off for the purpose of repairing a dam.

"Wherever I have seen typhoid fever in ill-ventilated rooms, or where the surroundings were foul, the fever has been of a low type, and has proved more fatal."

Hanson.—"I have found typhoid fever to be more prevalent in low, wet and foggy locations, and have sometimes been suspicious of the influence of foul cellars."

Hyde Park.—"Typhoid fever, a disease of common occurrence. Have found foul privies on the premises, where repeated and fatal cases of typhoid have occurred, but have not always so found them. Do not think connection can be traced with other causes mentioned in third question."

Kingston.—"We have but little typhoid fever. No epidemic for twenty years. I had five cases in one neighborhood last year in houses supplied with spring-water. Also two other cases in a house with a wet cellar and near a mill-pond, which had been drawn off."

Lenox.—"Nearly every case of typhoid in my practice can be traced to foul privies, decaying vegetable matter, obstructed drains, or wells below the level of cess-pools, privies, or manure heaps."

Leominster.—"Typhoid was prevalent in the fall of 1869, but except in four families the cases were isolated, scattered over different parts of the town, and without known or suspected cause. In the first of the excepted families there were five cases in a family of eight. In the second, four miles from the first, there were four cases in a family of six. In the third, far removed from either of the others, there were seven cases in a family of ten. All three of these families were farmers; the water used was derived from open wells at some distance from the houses, with no possibility of anything running into them, as the ground around the wells was higher than the surrounding surface, and far removed from any contaminating cause existing upon the top of the ground, such as privies, drains, manure-heaps, &c. The water in the wells was rising, and remained higher than usual on account of the heavy and then recent rains. The houses of these three families were all on elevated ground, with no wet or swampy ground in their vicinity. The fourth family consisted of boarders, forty-one in number, operatives in a woollen mill. Twenty-two were within a few days seized with typhoid fever. The cause of the disease in this instance was apparent. *The drain of the sink had found access to the well.* A new well was dug and no

more cases occurred. For the last thirty years I have observed that typhoid fever prevailed here most extensively in those years in which the summer was dry, followed by a wet autumn."

Leverett.—Typhoid fever is an annual epidemic in the village, which is built on the banks of a rapid stream, having five dams supplying power to as many mills. The cause of so much fever in the village is not, in the opinion of our correspondent, stagnant water, but more probably a cider-mill, where the pomace from the apples is heaped up yearly and left to ferment, so that in the hot season, with a west wind, the odor can be perceived throughout the village. There is now a great mass of this pomace which has been accumulating for years. There is a good deal of fever in this section of country, but more in the village than in all the rest of the town.

"An epidemic of typhoid occurred here some time since from the flowing of a meadow, and then draining it. After it was drawn off every family living around the pond had typhoid fever. I have observed that if one member of a family is attacked some of the others are almost sure to be if the rooms are small and ill-ventilated. Among the causes of typhoid which I have observed, may be mentioned, slops thrown on the ground, putrescent puddles from sinks under the window, rotting vegetables in cellars. Typhoid is often caused by decaying vegetation, ceasing after a hard frost. I have had cases occur after digging muck in swamps, and working around ponds that were drying up.

"Two years ago three boys went in swimming in a foul pond of water. In just two weeks afterwards they were all taken down with severe typhoid fever."

Littleton.—"I have observed that typhoid fever has assumed a graver type when the cases have been near a slaughter-house. It seemed to be aggravated by the impure air arising from the decomposing animal matter."

Lawrence.—"Many cases of typhoid fever occur in overcrowded and ill-ventilated sleeping-rooms, as well as from all the causes mentioned in the fourth question."

Lowell.—"In reply to your questions concerning typhoid fever, I would say that no opportunity is afforded in this city for observing the difference in the prevalence of the disease between houses supplied with water from wells and those supplied from springs or ponds. All our water is from wells. This water, in the thickly

settled localities, is highly charged with impurities. The worst example is a well on the corner of Lowell and Dummer Streets, which is exposed to the washings of streets, and the drainage of vaults and sewers, filtered through a few feet of earth. A gallon of this water contains fifty-two grains of inorganic and twenty-five grains of organic residue, but in spite of this impurity it is not unpleasant to the taste, and is used by at least one hundred families. Works are now being constructed to supply the city with pure water.

"During the year 1869 there were thirty-four deaths from typhoid fever in Lowell; a greater number than in any year since 1857. With a view of answering your inquiries, I have looked up the recorded residences of the deceased, and found, contrary to my expectation, that this disease was less fatal in the filthy than in the well-ordered districts, as will be seen by the following statement:

Number of deaths in worst localities,	. . .	5
of deaths in localities somewhat better,	. . .	5
of deaths in well ordered sections,	. . .	24

"In Lowell, Winter, Williams and Middle Streets, regarded as the filthiest in the city, there were no fatal cases. If one may deduce any conclusion from the mortality in Lowell in a single year, it would appear that though filth, putrid air and impure water are active agents in causing scrofulous, tubercular and bowel diseases, they have but little if any effect to cause typhoid fever.

"The greatest mortality from this disease is in August and October. The greatest number of deaths occurred between the ages of twenty and thirty. Recent residents seem to be most susceptible to attacks of typhoid fever. I have in mind instances where it seemed to extend itself by contagion."

In a subsequent letter, our Lowell correspondent says: "You request me to give the population of the districts referred to in which the number of deaths from typhoid fever differed so greatly. It is difficult to estimate the number of persons living in these localities. Some streets are wholly good, bad, or indifferent in a sanitary point of view, while others may have two or even three of these conditions in different parts of their extent.

"The only convenient way that suggests itself to me is to divide the population into nationalities. Lowell has a population of about forty-two thousand. The Irish and those of Irish parentage number fifteen thousand strong, and there are three thousand French Canadians. The Americans and a small number of English, Scotch

and English Canadians constitute the remaining twenty-four thousand.

“Now the Irish and French Canadians, as a rule, crowd into the bad and indifferent localities, and almost wholly disregard hygienic laws. The Americans, on the other hand, as a rule, live in the well ordered sections and observe hygienic laws, but notwithstanding this, and also the fact that the mortality from all diseases for the year was forty-three more among the former than the latter, we find, what appears to me singular, that the mortality from typhoid fever among the Irish and French Canadians was only seven (five in the bad and two in the indifferent localities), while among the Americans it was twenty-seven (twenty-four in the good and three in the indifferent districts).”

In addition, we have the following history of typhoid in Lowell in 1870:—

“In reply to yours of the 6th ultimo requesting me to give the mortality in this city from *typhoid fever* during the year 1870 to the first of December, observing the same order regarding locality and nationality as that adopted in a communication respecting the same disease in 1869, I would say that I find the whole number of deaths from the disease to be 31; of this number 16 were in good, 4 in bad and 11 in indifferent localities or sections of the city. Among the American population (including the few English, Scotch and English Canadians) there were 15 deaths; 11 in good and 4 in indifferent locations. Among the Irish and French Canadian population and those of Irish and French Canadian parentage there were 16 deaths; 5 in good, 4 in bad, and 7 in indifferent locations. During the year 1870, to the first of December, there have been 879 deaths from all diseases and causes. Of this number 356 occurred among the American and 523 occurred among the Irish and French Canadian population, an excess among the latter over the former of 167 deaths. By the above statement it will be seen that typhoid fever has caused 4.21 per cent. of the deaths among the Americans and only 3.06 per cent. of the deaths among the Irish and French Canadians. Or to state it in another way, typhoid fever caused one death in every 23 deaths among the American and only one in 32 deaths among the Irish and French Canadian population.”

Lexington.—“I had eight or ten cases of typhoid fever in 1865 in a circle twenty rods in diameter. I noticed that within this area sinks disgorged their filth on the surface of the ground close to the houses, the privies had no vaults, the excrement lying on the sur-

face of the ground; a pigsty was an invariable appendage to each house or shanty, and often the house formed one side of the sty; the weather was unusually warm, and the stench horrid. At the same time a large piggery from twenty to forty rods distant was daily replenished and enriched by loads of slaughter-house offal. The air from it at times was almost insupportable. Sleeping and other rooms were small and badly ventilated."

Leyden.—Typhoid fever a rather prevalent disease. Our correspondent regards it as due to a specific poison in the atmosphere at certain seasons of the year, "coming we know whence," rather than to sanitary neglect. He has, however, frequently observed the disease to prevail where animal and vegetable matter was in a state of putrefaction, as near foul privies or over damp cellars holding decaying vegetables.

"In one family six persons had typhoid fever and three died. In this instance the privy was found to communicate with the well."

"The soil of the town, is, on the whole, rather dry than wet; surface uneven, and much exposed to north-west winds. Typhoid prevails more on the low than on the high ground."

Marshfield.—Our correspondent at Bridgewater writes as follows concerning a malignant form of fever which he witnessed at South Marshfield in 1842, and of which he thinks no account has ever been published:—

"In the spring or early part of the summer of 1842, Daniel Webster, who lived three miles from South Marshfield had a large surface of ground, in the vicinity of his homestead, covered with fish (some hundreds of cart-loads of menhaden), which were left to decompose during the warm weather. I was living in Hanover at that time, but was frequently called to the neighborhood in question. South Marshfield is in a hollow, bounded on the north-west, west and south-west by hills covered with forests which extend back several miles. In going from Hanover I passed through this forest and emerged from it on a high hill overlooking the village. From this hill I noticed a most offensive stench which continued several weeks. There was no unusual sickness in Mr. Webster's neighborhood, but in South Marshfield a very malignant form of typhoid fever began to prevail about the middle of July. Some of those attacked died in forty-eight hours without reaction. Many of those who lived a week had gangrenous spots, which sometimes became sloughing ulcers an inch in depth. A few recovered under the

influence of tonics and stimulants in very large amounts, but they made slow progress to health.

"In the latter part of August there prevailed a malignant form of erysipelas, with rapid and extensive sloughing of the skin."

Our correspondent has no doubt that these diseases, appearing as they did to leeward (by prevailing wind) of the great accumulation of putrid fish, were due to this cause.

Martha's Vineyard.—Our information from this quarter is of an interesting character. The following remarks are from a medical man, a former resident of the island: "The eastern end of the island is sandy, chiefly drift. There are very few wells, and the people, in general, drink rain-water from cisterns. At the western end the land is high and hilly, and the water used is mostly from wells." [The division of these sections is indicated in a pen-and-ink sketch enclosed by our correspondent by a line running nearly north and south through the middle of the township of Tisbury. The island of Martha's Vineyard is thus divided into two parts of about equal area.] "It is my opinion, gained from several years' residence, that cases of typhoid fever are as ten west of the line to one east of it."

Our regular correspondent at Holmes' Hole writes as follows: "There is, without doubt, some influence or other which regulates the prevalence of typhoid fever upon this island, resulting in an almost complete absence of the disease in the eastern end, and confining it to the hilly part in the north and west. This latter region is almost all of it in the town of Chilmark. Now the population of Chilmark is to the rest of the county as one to four,* yet there is said, by the physicians who practise there, to be more typhoid there than in all the rest of the county. In the village of Holmes' Hole an epidemic of typhoid and dysentery occurred seven years ago, and all the fatal cases were on the same side of the same street. From all that I can learn, the conditions of the case are these: all the wells in the eastern part of the island are on the level of the sea. Those near the water's edge ebb and flow with the tide. In those further back this phenomenon is not observed, yet in these it is necessary to dig down to the sea-level in order to obtain water. As the land rises it is difficult to obtain water from the deep wells. This leads to the discontinuance of their use, especially in Holmes' Hole, where cisterns for rain-water are substituted. In Chilmark, the hilly region, spring water and well-water are almost universally used. The wells are on a higher level than the sea, caused no

* One to six, according to Census of 1865.—SEO'R.

doubt by the clayey substratum which forms basins for the collection of the water. On the side of the street referred to in Holmes' Hole, where typhoid and dysentery prevailed, every fatal case was in houses supplied with wells. No cases, fatal or otherwise, occurred in houses provided with cisterns, the water of which was used for drinking purposes. The only case of typhoid I have known since I have been in practice in this village was imported."

Our correspondent in West Tisbury practises also in Chilmark, the adjoining town, and may speak for the western end of the island. He says: "Probably more cases of typhoid occur in the town of Chilmark than in all the rest of the county." [This fully confirms the opinion above given by a former resident of the island.] "I have imputed this to the character of the subsoil, which is clay, retaining the moisture, and also to the greater fertility of the soil. Typhoid is comparatively rare in the eastern part of the island, where the soil is light and sandy and the vegetation sparse.

"In several instances I have known typhoid to follow the taking down and repairing of old houses while the family still lived in a part of them; but in a majority of cases I have been unable to assign any cause. The inhabitants in the region of my practice use either well or spring water,—generally the former. Occasionally a family will use cistern water in winter. I have never observed any connection between typhoid and foul air from decaying animal matter, as fish spread on the land for manure, but I have thought the disease prevailed more extensively where vegetation grew luxuriantly and where large amounts were left on the ground, in the fall, to decay."

[The condition of the camp-grounds at Martha's Vineyard in the summer of 1869 was such as would lead an observer to predict that sooner or later they would be visited by pestilence. They certainly violate the plainest teachings of hygienic common sense. The buildings are so close together that ventilation is obstructed; they have no drainage; there is no adequate provision for the removal of refuse; the privies and wells are everywhere in close proximity, and most of the houses are so shaded by trees that direct sunlight can hardly ever reach them.—SECRETARY.]

Mendon.—Our correspondent, who has practised in this town during the past forty-four years, reports that during that period he has not met, in the usual circle of his visits, with more than (by estimation) one hundred cases of typhoid fever. "Many years ago, during the autumn, all the members of a family, six in number, had typhoid fever, mostly of a mild type. Three or four other families,

within sixty feet of the first, did not have a single case. The family in which the cases occurred was remarkably neat, and from garret to cellar everything, in a sanitary point of view, was well cared for. In the autumn of 1836, while the only physician in Milford was sick, I had the care of some thirty cases of typhoid in that town. I attributed its prevalence at that time to the fact that a large, shallow pond which had for a long time been covered with water was, during that year, bare. The Milford cases were all confined to the valley in which the pond was located, and no cases occurred beyond the summit level on each side of it, east and west (the stream running south)."

Medway.—"There is a large swamp near the centre of the town, but the land around it is generally somewhat elevated, and but few people live near its level; those who do I think are more subject to fevers. We have had no general epidemic of typhoid since 1839. At that time the most severe and fatal cases were observed to be in houses with bad drainage and exposed to the influence of decaying animal and vegetable matter."

Montague.—"Typhoid fever occurs where the surface water has drained off or dried up, leaving vegetable matter, which at other times is covered, exposed to sun and air. My observation leads me to believe there is a close connection between this disease and foul soil and putrid air. It prevails more in the lowlands about swamps and stagnant water than in the upland."

Middleton.—"Thirty years' practice. Typhoid a rare disease. When it has appeared, it has been by single cases, without any apparent cause. If the greatest care was not given to ventilation, it has spread by contagion."

New Marlborough.—"I have no doubt that foul soil from privies and pigsties is often connected with the development of typhoid fever, although I have not met with such cases. I have observed instances in which I thought the disease was due to rotting vegetables in cellars, and to old cisterns with stagnant water, and I make it a point when I have cases of typhoid to look out for these causes of impurity, and to remove them when they exist."

Newburyport.—"Water supplied from neighborhood wells. A pump on the highway affords water for twenty or thirty families. Some old estates have wells on the premises. No connection

observed between this water supply and fever. During the war, have seen typhoid originate in camps from unventilated quarters and decomposing vegetable matter."

Nantucket.—Our correspondent recalls two cases of typhoid in one house some years ago which were apparently caused by a mass of turnips which had been left in the cellar and forgotten until their presence was made known by the smell of decomposition.

Northbridge.—The disease not a common one here; but the old village of Northbridge Centre, situated upon a hill, is thought to have comparatively more cases than the factory village, situated on a stream and in a valley.

Newton Centre.—Typhoid is rare here. "In ten years I have seen not more than twelve cases, and two-thirds of these occurred among the theological students, on the top of a very high hill, where the subsoil is *tough marl*; the other four were at the base of the same hill, where the soil was swampy and the house-sills decayed. Improvement in two of these cases was very marked after removal to higher and drier land; two other cases were fatal. The village lies on a plateau, one hundred and fifty feet above Charles River; has most excellent surface drainage, and is *underlaid with an unfathomed bed of loose gravel*."

Orleans.—"Typhoid fever was first known in this town and vicinity in the spring and summer of 1837. It was then epidemic and severe, and pervaded the whole town. I could never trace the cause to bad drinking-water, decomposing matter about the premises, bad ventilation or any local filthiness; but in my opinion, the atmosphere of the whole place had become contaminated, tainted, *poisoned* by the noxious exhalations from low, marshy grounds surrounding the numerous inlets from the sea (forming ponds of mingled fresh and salt water of greater or less extent) with which this town is sadly cut up. Typhoid fever has stuck to us ever since 1837 in the summer and autumn, but most prevalent and most severe in dry seasons. The towns on the south side of the Cape were comparatively exempt from fever at the time it first appeared in Orleans, and for several subsequent years; but of late, sporadic cases are quite common. The town of Chatham is geographically very like the town of Orleans, but there are counteracting climatic influences."

Oxford.—Opinions based upon a practice of forty years.

Our correspondent says: "I have very frequently observed a

marked connection between typhoid fever and exhalations from privies, cess-pools, pigsties, foul cellars, &c. These, together with filthy and unventilated places of living and sleeping, have appeared to me to be the cause of typhoid fever in a great majority of cases. So firm is my belief of this that when I meet with a case of this fever not readily traceable to some of these causes, I infer that the truth has not been told me, or that my perceptive faculties have been at fault."

Pittsfield.—Has good reason to believe in the production of typhoid fever by local causes. In the summer of 1864 this disease appeared among the pupils of the Maplewood Institute. Among seventy-seven young ladies occupying the premises, fifty-one were attacked, and thirteen died. Three servants also died. A thorough investigation of the causes of this pestilence was made by three professors of the Berkshire Medical College, whose report was published. The water used at the school was brought by an aqueduct from hills outside the town, and was of unquestionable purity. During a few days in July this water gave out, and the supply was from a well in the neighborhood used by several families, none of whom suffered from illness. There seems to have been no well on the premises. The committee were of opinion that water had nothing to do with the disease. A few rods from the school was a barn, whose yard was a basin holding foul water, in which swine wallowed, emitting an offensive odor. The kitchen drain discharged its contents on the surface of the ground. The vaults of the privies were shallow, filled to overflowing, and emitted an odor very offensive, and at times pervading the whole building. The grounds were excessively shaded by trees, and the sleeping-rooms were so shaded by piazzas and vines that the direct rays of the sun could not reach them. These were the causes of the fever. At the same period there was no unusual sickness in Pittsfield, and since the removal of the causes above described, the Maplewood Institute has been exempt.

In December, 1835, typhoid fever appeared in Pittsfield in a family of about forty persons, a boarding-school for boys. The head of the school and four boys died. Eight or ten other cases recovered. The surrounding community was healthy. In this family the water used was from a well under the wash-room. The drain from the wash-room was obstructed, and the foul water found its way under the floor and into the shallow well. The well was closed, and the family supplied with water from another source, and the fever subsided.

The published report of the board of health of the town of Pittsfield for the last year shows the most intelligent interest in the prevention of disease, and the citizens of that town may be congratulated on having such faithful guardians of the public health in the gentlemen who constitute the board.

Since the above was written, our venerable correspondent at Pittsfield has been removed by death. The town authorities have promptly appointed a successor, who writes to us concerning typhoid in 1870. "A case of typhoid fever under my care in September appeared to be caused as follows: The man was engaged in laying drain-tiles in a meadow, with two others. They all drank while at work from an old well in the meadow, supplied only by meadow water. This case of fever was severe, but recovery followed. It so happened that the other two men engaged in the same work, both came to me, one a few days before, and the other a few days after the case of fever occurred, with violent headache, general pains, and nausea. Both immediately recovered after a vigorous catharsis, followed with quinine; but I attributed their symptoms to the poison of the meadow well.

"Another physician of Pittsfield reported to the Medical Society in September two cases of typhoid occurring in the immediate neighborhood of an overflowing and very foul cesspool from an hotel. The same physician also reported in August a case of typhoid in a very old house, under which a cellar was being dug, disturbing a great quantity of rotten timber.

"Another physician of Pittsfield, had three cases of typhoid in July, in a house built upon a meadow, through which, and near the house, flows a sluggish brook, which receives all the sewage of the town. This house is also surrounded on three sides by stagnant ditches, foul with sewage. Most of my own cases have been of obscure origin."

Our correspondent states that typhoid has been unusually infrequent in Pittsfield during the past summer, and adds: "I am quite sure, and it is the general impression here, that our comparative freedom from fevers during the past summer, has been largely due to the activity of the town board of health, in causing the immediate removal of every removable nuisance or source of sickness. Our board of health has now acquired so established a character that our 'notices' have been immediately complied with. In only two cases has it been necessary to remove a nuisance and collect charges of the owner."

Provincetown.—"In a practice here of more than thirty years,

typhoid has been a rare disease; never epidemic. I have had sporadic cases which were aggravated by ill-ventilated rooms.

"Our wells rise and fall with the tide at all seasons, and afford very pure water."

The following letter was received from Provincetown in December, 1870, in reply to a question whether putrid fish had ever been known to cause typhoid fever in that town:—"I came to Provincetown in December, 1839. During that year typhoid fever (as it was called) had prevailed epidemically, and was very mortal. It had subsided so that I did not see any of the cases. During the winter much was said about the offal of fish, left on the shores unburied, as the cause of the fever of the preceding season. At the town meeting in February, a very efficient man was chosen as health officer, who kept the shores clear the following year, and there were but few cases of typhoid. The shores have been kept clean from that time to the present, and typhoid has diminished. For fifteen years past typhoid fever has been almost unknown among us. Now and then a sporadic case occurs; whether this is owing to our keeping the shores clean, or to the inhabitants taking better care of themselves, the fact is that typhoid is so rare with us that we do not look for it unless it is imported, while Truro, Wellfleet, Eastham, Orleans, Chatham, are not so exempt. We shall keep our shores free from filth for general convenience, and if by so doing we keep off disease, we are by so much the gainers. We have swamps which have been in a great degree converted into cranberry bogs, by being filled up with sand, and this I think, has had some influence in making this a healthy spot. I should say that in the towns above referred to, typhoid fever cannot be referred to decaying fish left on the shore, for they are not exposed to this danger as we are. I still believe that decaying vegetable matter and impure water have more to do with the production of typhoid."

Pembroke.—"Some of the most severe and fatal epidemics of typhoid dysentery I have seen occurred in very dry seasons, in the vicinity of large ponds, or low marshy places usually overflowed, but then exposed by prolonged drought."

Rose.—Our correspondent has had an experience of thirty-eight years' practice of medicine in this town, and answers our first and third questions in the negative.

Typhoid has seldom originated here, but has often been imported. "In one instance we had an endemic fever, arising from the flowing of an artificial pond. It did not seem to be pure typhoid, so I

called it the 'pond-fever.' All the cases recovered. Some years ago a case of typhoid was imported into the neighboring town of Monroe, from a region where fever was prevalent. It was communicated to the attendants and visitors, and was of a severe type, causing many deaths. It was a strictly contagious disease.

"On another occasion, in a high and healthy part of the town, a family of four persons came down with the fever. They were neat and tidy people, but I always thought in this case there must have been some impurity about the premises. All recovered."

Randolph.—"Typhoid usually occurs among us from August to November inclusive. Occasional cases occur during an open winter, or in the following spring. Its time of prevalence generally coincides with the season of low water, but it ceases for the most part with the coming of dry, cool weather, whether the autumn rains have been heavy or light."

Rutland.—"Although I have uniformly tried to discover the connection between cases of typhoid fever and its alleged causes, my experience has been negative rather than positive. There are several neighborhoods in the region of my practice the atmosphere of which in the warm season is often rendered very offensive by the offal and pigsties of slaughter-houses, and the draining off of two or three large reservoir ponds used for the storage of water for factories. This has been especially true this season, but typhoid fever has never prevailed in these localities more than in others; and never at those particular times and places when and where they would naturally be predicted.

"For many years after my first residence in this town (1839), probably a dozen, I never saw a case of typhoid fever on the summit of the hill on which the centre village is located, unless it was imported. A very few since that time have originated there. The hill is of about eleven hundred feet elevation above tide-water, and has no wet subsoil. In digging wells which are the only supply for water, a ledge is always encountered, at a depth of eight, ten or twelve feet. The base of this hill has not had the same immunity from this disease. About a mile to the north of this hill is another of about the same height, on the summit of which there have been, until within a few years, two families. In both of these houses typhoid fever used to be of very frequent occurrence. In one of them, which was burned down six or eight years ago, it was rare that a hired man or a female domestic escaped the disease the first autumn. I never could quite satisfactorily explain the prevalence

of typhoid on one of these hills, and the comparative immunity of the other, unless it was because one was wet soil and the other dry.”

Rockport.—“Although dysentery and typhoid fever are seldom absent during the latter part of summer and the fall, they have only once presented a sufficient number of cases to warrant being called ‘epidemic.’

“While the typhoid epidemic was prevailing there appeared to be nothing unusual in the state of the atmosphere; but during the epidemic of dysentery, the weather was unusually hot and dry, many of the wells were dry, and rain was withheld until far into October. In neither instance could the disease be traced directly to any decomposition of animal or vegetable matter, but in both seemed to spread from communication with the sick. Within a few years, however, I have noted cases of typhoid which seemed to be connected, in one instance with vegetable, and in another with animal decomposition. In December, 1868, I was called to see two cases of typhoid in a room underneath which was stored a large quantity of turnips and cabbages which were rotting, and the odor from which was extremely unpleasant. Soon after two other cases occurred in another family in the room immediately over the first, while in the opposite end of the house, also occupied by two families, but not directly over the vegetables, no case occurred. There was but one other case in the neighborhood about that time, and that was in the house adjoining. During the hot and dry weather in the latter part of the summer of 1869, some fifteen cases occurred in quick succession in tenement houses owned by the ‘Rockport Granite Company.’ Most of them were under my care. These houses were situated on a high and broad ledge, with very little soil on its surface,* to absorb the semi-liquid contents of a half dozen privies and pig-pens which flowed out over its north-east declination towards the sea. The stench was almost intolerable. On my representing to the clerk of the company the possible effect of such a state of things, the premises were freely strewed with quicklime, and subsequently covered with dry coal ashes. The adoption of this modification of the dry earth system was soon after followed by copious rains, which washed the surface of the ledge and carried into the sea much of the filth which had accumulated during the summer. No new cases occurred, and I am led to believe the means used, along with the atmospheric changes prevented the spread of a serious disease.”

* Compare with remarks of Worcester correspondent on “ledges.”—S&C’r.

Reading.—"Three years ago there prevailed here an epidemic of typhoid dysentery, beginning in the middle of August, and lasting about six weeks. There were eighteen deaths. One, a young girl, was living in a high, dry, healthy spot, a half mile from the rest. All the others were in or near a circumscribed locality, low, level, wet; the ditches full and overflowing, the wells also, and some of the latter I know were offensive. The season was unusually wet. The rest of the town, and the adjoining towns were remarkably healthy."

Rochester.—"Forty years ago typhoid prevailed extensively in this town. I was then in practice, but I cannot from memory throw any light on the causes. A few years since I knew a whole family sick of typhus from a very foul cellar. One died."

Sutton.—In illustration of the effects of drinking-water made foul by decomposing organic matter, the following instructive facts are related by our correspondent:—

"A large house in this village is supplied with water from a well in the front yard, three rods from the house. Connected with the house is a barn without cellar, some three rods from the well. In December, 1868, a trench three or four feet deep was dug from the well to a point near the middle of the barn, where a pump was set and a pipe connecting it with the well was laid in the trench; after which the earth, which was in large frozen chunks, was filled back into the trench. In the house was kept a boarding-school for boys, of whom there were ten or twelve. Three little girls were also there, aged twelve, eight, and three years, belonging to the family of the owner of the house; there were therefore fourteen or fifteen children who drank from the well. The oldest boy was seventeen or eighteen years old, while the others were of ages from ten to thirteen.

"Everything went well until after the thaws in February and March, 1869, when the water had a decided taste and smell of stable-manure. March 26th, one of the boys, thirteen years old, was seized with typhoid fever; another, twelve years old, on the 31st of March; another, eleven years old, April 2d; another, ten years old, April 4th, and another, twelve years old, April 9th. April 20th, one of the little girls (eight years old) was seized. Each of these six children (all of whom finally recovered) drank water with their meals from the well in the yard. Some of the older boys drank coffee in the morning and tea at night. The manner in which these children were attacked, and the fact that this

house had been free from typhoid fever for many years, and the water heretofore known to be very pure and wholesome, leads me to the conclusion that the use of the water thus impregnated was the cause of the disease occurring where and just at the time it did. My theory is that while the ground, manure, &c., under the barn, were frozen, the water was all right; but when it thawed, and the previously frozen filth leached through the soft and loose earth along the track of the pipe into the well, the effect of the poison was felt most perceptibly by those who used the polluted water most freely, while those who used it less freely escaped entirely."

Salem.—"In one season, typhoid fever prevailed extensively along the banks of the North River, but of late years it has shown no more preference for that locality than for other parts of the city. Cases seem to be quite equally distributed about the city, without regard to soil or water supply, whether from wells or aqueduct.

"It has been a matter of surprise that the old mill-pond has not been a more fruitful source of disease than it has hitherto been, as its surface is covered, during the hot season, with decaying vegetable matter."

Somerset.—Our correspondent thinks that the influences of marshes, and not those referred to in questions 3 and 4, are concerned in the cause of typhoid fever.

Shelburne.—Our correspondent reports twenty cases of typhoid, of a severe type, which occurred in 1868, in a little hamlet of eight houses at the confluence of the North and Deerfield Rivers. With one exception these houses were clean, of rather recent construction, and free from any discoverable cause for the disease.

Shirley.—"I give you the history of typhoid fever as it has occurred in a certain house in this town; not as throwing light on the questions you have submitted, but from the regularity of the intervals being very peculiar.

"1st. In 1818, when four deaths occurred.

"2d. In 1836, three cases and one death.

"3d. In 1856, six cases and three deaths.

"On neither of these occasions was the disease specially prevalent in this vicinity. The house is in a valley on a small, sluggish stream, a tributary of the Nashua River. No other local cause was ever recognized. The commencement of the disease each year was in August."

Somerville.—The most severe epidemic known here in fifteen years occurred in July and August, in a section of the town sloping to the south, with decidedly dry soil and with good well-water. "I regard bad air as one of the principal causes of this disease. The most unhealthy condition we ever experience is to live in a house with a wet and imperfectly drained basement. Large and well-ventilated sleeping-rooms are indispensable to health, and equally so for the recovery of the sick."

Shrewsbury.—"I have observed for some years an apparent connection between foul soil (and consequently air) and typhoid fever. I have often believed a vile sink-drain, or rather sink-pool, to be the cause; also, butchers' slaughter-yards, the foul effluvia from which have seemed to favor typhoid and dysentery of a low grade."

Spencer.—"Have observed instances where typhoid fever seemed to be directly caused by foul air from pigsties and privies. Five cases at an isolated farm-house, in 1867, apparently due to the foul air from a pigsty. The disease more prevalent in houses supplied with water from wells."

Stockbridge.—"A few years since there were several tanneries on the river just above us, from which tons of filth were cast into the stream to be borne away or scattered over the low lands, as chance or flood might direct. The result was a dreadful stench and a prevalence of typhoid fever, causing numerous deaths. The tanneries were finally removed, and water introduced from a neighboring hill through iron pipes; and, with a purer air and delightful water, typhoid fever has almost become unknown. Nearly all the people used wells formerly, while we now have a fine reservoir."

Stow.—[See remarks on diseases most prevalent in towns.]

Southampton.—"Have observed typhoid fever to prevail with great severity in a neighborhood where a mill-pond had been drawn off, leaving the debris at its bottom exposed to a hot sun, generating putrid air."

Stoneham.—"I think there is a connection, and an intimate one too, between typhoid fever and foul soil. Several cases could be distinctly traced to this source, in the form of filthy privies and pigsties."

Springfield.—"In three-fourths of the cases of typhoid fever

coming under my observation, in this city, during the past eight years, *foul soil* from privies or defective drains was present, and in, I should say, one-third of the cases impure privies were on the premises. Most of my cases of typhoid have been found in ill-ventilated apartments and overcrowded tenement-houses. In a large number, I could trace the cause directly to impure air from decomposing animal matter. In several families where it prevailed the cellar was inundated with sink-drain water.

"Since the more general introduction of water from springs, by the Springfield Aqueduct Company, there has been a diminution in deaths from typhoid. Of late the drainage has also been better. There has been no epidemic of typhoid during the eight years of my observation; but the cases have been sporadic, springing up here and there wherever some focus of infection has seemed to be produced by decomposition."

Sunderland.—"Typhoid fever has only once prevailed here as an epidemic during the past twenty years. It was then (1851) as I doubt not, due to imperfect drainage. The season was very dry and hot. I then called the attention of the town to what I regarded as the cause. The drains were opened and have since been kept open."

Our correspondent in reply to the third question of the typhoid circular says: "In several instances, the connection has been of such a nature as not to admit of a reasonable doubt. In one case a whole family was down from the influence of a neglected cistern."

Sterling.—Our correspondent reports that typhoid has prevailed in this town and vicinity to an alarming extent during some past seasons but not within the period of his own observations.

Swampscott.—Three cases of typhoid are reported as occurring at about the same time, and among the crew of the same schooner. They had been exposed on board to the emanations from a quantity of putrid clams which were very offensive.

Taunton.—"The disease has been observed to be prolonged and convalescence made tedious when sinks and cess-pools and cellars were neglected.

"It is not unusual to meet with cases of typhoid in boarding-houses of unskilled laborers. In such cases I have sometimes found them in an attic room with three beds, two men for each bed, one window in the room and the upper sash fixed."

Truro.—"There has been a good deal of typhoid fever here the last year, and I have observed that nearly all the cases have been around a low, marshy meadow over which the tide used to ebb and flow, but from which the salt water has been excluded of late by a dike built about a year ago."

Tewksbury.—Our correspondent states that some years ago, while he was in charge of the Monson State Almshouse, typhoid broke out in a detached building occupied by idiotic and epileptic patients, and was arrested by clearing it out, and having it thoroughly cleansed. Typhoid rare in Tewksbury, either inside or outside the State Almshouse.


Upton.—"I think I have observed a connection between typhoid symptoms in fever and other diseases, and foul air and soil from want of proper drainage, unventilated sleeping-rooms, and decomposing substances in and about the houses; and where these conditions of impurity were most obvious typhoid was most severe."

Uxbridge.—Several cases in one house apparently proceeding from filth spread upon the ground from a sink-drain. No new cases after removal of cause.

Webster.—Our correspondent believes that putrid air about houses is a prolific cause of typhoid. "During an epidemic of typhoid fever in 1864 I met with about forty cases in three tenement houses. The houses were one story, with basement tenements, and cellars only in the rear of the basement. All the fever cases occurred in the upper tenements during the summer and autumn. Not a case occurred in the basements until late in winter, and then only two or three mild cases. I attributed this to the exhalations from the cellars and sink-drains having free access to the rooms above, but not to the rooms below."

Ware.—Our correspondent has not been able to plainly trace the origin of fever, in the cases under his observation, to the causes enumerated in questions 3 and 4, except in a young man who had typhoid after cleaning a dirty cellar. While engaged in the work he complained of its making him feel sick, and two weeks after came down with severe typhoid fever.

Instances of apparent contagion from one case to another have been observed.



Westfield.—"Have had a great many cases which could be directly traced to decaying vegetable matter coupled with moisture, in cellars and about houses."

Warren.—"In two instances have thought there was a connection between the disease as it appeared and ill-ventilated cellars."

Winthrop.—"One section of this town is, from some cause entirely unknown, very subject to typhoid fever. In one house, built ten or twelve years ago, there have been at different times fourteen cases. Local causes have been often sought for but never found. The situation of this portion of the town is high, and very much exposed to wind. The soil is rather springy and cellars often damp."

Wrentham.—"Typhoid fever not by any means a prevailing disease. Twelve cases under observation of our correspondent last September. "In each place where it occurred, the water used by the family was of questionable purity, privies or sink-drains being very near the well. In one instance a direct communication between an obstructed sink-drain and the well was shown to exist." Our correspondent has met with no case of typhoid in families supplied with water from springs or ponds; and in a subsequent letter informs us that he can recollect twenty-four families so supplied; and that there are doubtless others. In some of these families, water is obtained by dipping directly from the spring."

"Little attention is paid to the condition of cellars. Drains and privies are often too near wells. Hence typhoid and dysentery."

West Boylston.—[See remarks on diseases most prevalent in towns.]

Westborough.—"Our correspondent believes that he has often seen a connection between typhoid fever and foul soil and air, but limits the connection to cases in which the decomposing matter was under cover, as from cellars, or from drains which had become obstructed and thus thrown their contents back to the cellar or under the dwelling. He is also suspicious of the influence of shade-trees in close proximity to the house."

West Newbury.—"We have had no epidemics of typhoid or typhus for the past ten years,—a few cases arising from local causes. We have had, however, two epidemics of dysentery, ascribable to local exciting causes in connection with continued hot, dry weather. These causes were bad sink-drainage, filthy cess-pools and slaughter-

houses not properly disinfected, the waste being matter thrown into pig-pens to be partially eaten by pigs, and the rest to become decomposed, and render the air impure and noxious for quite a distance from them."

Wales.—"In years past have observed the connection between typhoid fever and foul soil and putrid air from dirty cellars and un-ventilated sleeping-rooms."

Watertown.—"In connection with inquiries 3 and 4, I will say that in all instances in which I have seen a succession of cases of typhoid fever in one house or in a small locality, I have diligently searched for some local cause of contamination, but have never, with a single exception, been able to discover any satisfactory one."

The "Boston Medical and Surgical Journal" for February 4, 1869, gives a history of some cases of fever originating in Watertown, which are doubtless the exception to which our correspondent refers. Five members of a family were successively attacked with typhoid fever in the autumn of 1868. A foul smell had been perceived soon after the first case occurred, and the drain was taken up and examined, *but nothing wrong was discovered*. Some weeks later, a *more careful* search being made, it was found that an opening existed between the drain and an air-box which conveyed air from without to a chamber behind the kitchen range, and thence to the bath-room and other parts of the house. *A third search* being made still later in the season, another opening was discovered beneath the wash-room floor. The workman who took up the floor was so overpowered by the effluvia that he had to be assisted to the outer air.

Winchester.—"I had last fall two fatal cases of typhoid in the same house, where the water came from a cistern exposed to contamination from a leaky sink-drain. At the same time the vault was overflowing, though not in a position to make it probable that its wash affected the cistern. They died of distinct blood-poisoning, but the other members of this family were not attacked with typhoid, although one was threatened with it.

"There is a tenement house in this town occupied by seven or eight Irish families, where for the past three years the sink-drains emptied into the cellar, whither also the wash of the privy worked after every rain. The well is in this cellar. Now I have known but one case of typhoid in that house. There have been several cases of diphtheria, two or three of which were fatal. I have made

various efforts to get the drains in this house put in order, but can effect nothing. It amazes me that there is not more severe sickness there, but it stands at a distance from any other house, and the children live out of doors, while awake."

Walpole.—"Typhoid fever not often met with. There is, however, one house in which it has occurred, in 1856 and 1858. It is situated on the north side and at the foot of a high hill, and is surrounded from the south to the north-west by low, swampy land.

"Some years ago, an epidemic of typhoid and dysentery occurred among the residents near a mill-pond which had been drained for the purpose of making repairs. Typhoid has more frequently occurred in the south part of this town (where there is low, damp land bordering a stream), than in any other part."

Waltham.—"A brook in this town flows about six months of the year; at other times there is only a ditch of stagnant water. It is just back of an Irish settlement. Typhoid usually commences here, and is more prevalent and more severe than in any other part of the town."

Williamstown.—Our correspondent reports an outbreak of typhoid of a severe type in August, 1868, in tenement houses on the grounds of the Williamstown Manufacturing Company. These houses (eighteen in all) are in two rows, placed back to back, with a space of thirty-three paces between them. In this street or passage, common to them all, are placed the privies; there is also a gutter which makes pretence of carrying away the water, but fails of doing it. Close by the front of the row, facing south, is a well; at this well washing was done, and when the sickness broke out the water was falling. The well had a pump and a platform about six feet square. At one side the water had worn a hole, and it is probable that the foul water from washing was drained from this hole into the well.

"About twenty cases of fever, with several deaths, occurred in the tenement houses using this particular well, and it was in the section of the tenement houses, of both rows before referred to, nearest this well that the outbreak occurred. Typhoid fever did not exist in other parts of the village at the time."

Westminster.—"A large proportion of the cases of typhoid fever observed here, have occurred in persons living in the valleys, or in persons who have been at work in low lands, getting

swamp hay. There are several places in the town where the land is flowed early in the season, and then the water drained off to allow a crop of grass to grow. I have attributed typhoid and dysentery, in part at least, to the exhalations arising from these places."

"Typhoid-dysentery prevailed last year in a particular locality. Five houses containing ten adults and fifteen children were affected, and not an individual escaped the influence in a greater or less degree. The cause was evidently the exposure to the sun's rays of the bottom of the pond. The prevailing winds were from the pond to the houses in question; houses still nearer the pond, but to windward of it, escaped entirely. After rain had fallen to fill the pond again the sickness disappeared."

Wilbraham.—"We have had an epidemic of typhoid among a few families living within a third of a mile of each other on the same road. Only one, or at most two in each family escaped its influence. The soil is wet, retaining water a long time; somewhat elevated, yet near the highway is a swamp, from which arises quite a stream of water. At one of the houses I learned that the sink-drain was broken, and that an unpleasant odor arose from it. From others the sink water was allowed to flow over the surface of the ground. The families are all in good circumstances, not exposed to want, or given to luxuries."

West Roxbury.—Typhoid fever rarely seen. In cases which have occurred, no satisfactory cause could be discovered.

Worcester.—Our correspondent has collected the opinions of several leading practitioners in his city.

One says: "Typhoid is a comparatively rare disease among us. It has occurred, however, in all parts of the city; quite as often in high, airy, well-ventilated houses, as the reverse. I have never been able satisfactorily to trace the disease to any particular cause."

Another expresses essentially the same views, and adds: "I have often remarked the strong predisposition to the disease in certain families."

Another says: "The worst cases have been on high ground, and under apparently the best hygienic influences."

Another believes that foul soil and foul air are causes of typhoid.

Another says: "When I first came to Worcester there was a row of privies in Maple Street, which drained into the wells near by, and typhoid fever raged until the use of the water was discontinued. I have found more of the disease on hills where, under

the soil, was a *ledge*. My opinion always has been that, in such places, the water became retained in cavities in the rocks under the soil, and was the cause of the disease."

Another says: "I think we have had less typhoid in Worcester since the introduction of 'city water.' When the disease raged so fearfully in Auburn a few years since, the wells were dry and the ponds very low. I thought that perhaps there might have been miasma from the ponds as a cause, but those living around those ponds were free from the disease. It occurred almost entirely on the hills. I have always thought that its increase was from contagion."

Yarmouth.—Our correspondent regards true "dothineritis" as one of the exanthemata or eruptive fevers; not influenced by the conditions enumerated in questions 3 and 4.

SHAKER COMMUNITIES.

We have endeavored in various ways to obtain definite information concerning typhoid fever among the Shakers in Massachusetts. Their habits of extreme neatness render them in this respect an exceptional people, and their experience, if it could be obtained, would be of great value. Our efforts have been only partially successful. The following is all we have been able to gather from reliable sources.

The *Lebanon Community* (just over the State line) numbers 400, of whom one-fourth are under eighteen, and there are none under five years of age. During the past year two cases of typhoid have occurred among them; one of these is said to have been contracted elsewhere. Twelve years ago, a woman employed in the dairy died from a violent form of typhoid, at a time when the dairy drain was obstructed. Since that time the drainage has been made very perfect, and fevers have been infrequent. The Shaker village is more elevated than the village of Lebanon, where typhoid is frequent. Epidemics of fever have sometimes visited the Shakers, having been severe in former years when drainage was bad. Epidemics of typhoid in the Shaker village, and in the village of Lebanon, have never been known to coexist; but sometimes when it has subsided in the one, it has immediately broken out in the other.

The *Hancock Community* numbers 150, of whom 25 are under eighteen, and none under 5 years of age. Their phy-

sician has been connected with the community for 43 years, and states that he has no recollection of a case of typhoid fever among them, although bilious and gastric fevers are not uncommon. [Physicians will see from this statement that it is a question of diagnosis.] He also states that since the partial drainage of Richmond Pond, which is less than a mile from the Shaker village, sickness in their community has increased.

It will be evident from all this, that the statements which have been sometimes made by tourists and sensational writers, that typhoid is an unknown disease among the Shakers, are incorrect.

Such is the evidence we have been able to collect concerning the causes of typhoid fever in Massachusetts. The more difficult task still remains of endeavouring to draw from it some consistent and reasonable conclusions. Let us try to find some continuous thread of probability, if not of proof, by following which a clearer idea of the relation of cause and effect may be finally reached.

There are some essential facts which do not appear in the evidence presented. First, as regards the season in which typhoid prevails.

The registration of deaths shows that it is a disease most rife in the months of autumn and early winter, but that no season is exempt. The observations of physicians would show that, when prevailing epidemically, it is found to begin usually in the months of autumn, and to continue till December, but rarely later. Individual cases (sporadic) are met with in every month.

During the five years 1865-1869, deaths are distributed among the months in the following order:—

*Deaths from typhoid fever in Massachusetts arranged by months.
Five years, 1865-1869.*

January,	363	July,	332
February,	316	August,	596
March,	338	September,	814
April,	301	October,	973
May,	318	November,	754
June,	249	December,	493

It is to be remembered that the origin of the disease must be transferred to the month preceding that in which death occurred.

We may say then that while typhoid occurs in every month of the year, the causes, whatever they are, which produce it are in greatest activity in August, September and October.

The liability of the sexes seems to be equal.

Age is an element of more importance. The registration returns are not to be depended on to determine its prevalence in infancy, since custom has permitted deaths from infantile fever (whatever that may be) to be incorporated with typhoid. It is well known and will be generally admitted that while rare, the disease does occur in infancy, and also at advanced age. It is, however, specially a disease of adolescence and early maturity, the maximum of deaths in any decade appearing between the ages of twenty and thirty.

Before attempting to examine the alleged causes of typhoid fever in Massachusetts, let us first see what has been the prevailing belief on this subject.

The late Dr. Nathan Smith, of Hanover, N. H., whose opinions upon all medical questions have had great weight in New England, is one of the few writers of preceding generations who have examined the causes of this disease. His observations were made, for the most part, on cases which he had seen along the Connecticut River, from Hanover to Middletown, during the years between 1787 and 1821. He believed typhoid fever to be propagated by contagion, and gives many examples in proof; also that, like other contagious diseases, it rarely affects the same person twice. Dr. Smith says:—

“I have not observed that situation has any influence either in producing or preventing this disease. It affects alike persons living on mountains and in villages, on plains and the banks of rivers, and on the borders of lakes and stagnant ponds. And I have not perceived that occupation or habits of life make any difference in their liability to receive this disease, nor has it in this country been confined to the poor and filthy; but affects nearly alike the rich, the poor and middle classes. * * * * It seems to possess a migratory character, and travels from place to place, and after remaining in one village for a longer or shorter time, as from one year to two or three, it ceases, and appears in another. * * * * The fact of the absence of typhus in a large section of country for an interval of

more than twenty years would lead us to doubt the possibility of its being produced by accidental causes; for in such an extent, and among so many people, it is impossible but that some of these circumstances should have occurred, and the disease of course be produced. Besides, if it can be communicated from one person to another, it has a specific cause, and I know no disease that arises from a specific cause that can be produced without the agency of that cause."

Dr. Smith's views with regard to contagion have certainly not been universally, perhaps not generally, received, but what he says about the migratory character of fever, and its disposition to attack all classes of persons without regard to location or habits of life, has, until recently, been generally believed by the medical profession in New England ever since his time. It is doubtless the present opinion of a large number of our correspondents who have replied briefly to our questions, and among them are some of the most intelligent observers of disease among us. This view is expressed by our correspondent at Cambridge unreservedly, and by many others with certain qualifications. Our correspondent at Leyden says that at certain seasons "it comes, and we know not whence."

But the disposition to pry into all the secrets of nature which marks the present period, and in which the medical profession has been foremost, has led to more careful inquiry and comparison with regard to the whole tribe of epidemics. Men of research and of great ability have probed the history of the epidemics of the middle ages and have made it appear more than probable that their virulence, if not their origin, was due to the filthy habits of the people. Special epidemics among the inferior animals have been studied with great success during the past twenty years and their causes shown. (See Parliamentary Reports on Cattle Plague; also Pasteur's investigation of the cause of "Pebrine" in the silk-worm.) Diseases of men previously quite as obscure in their causes as typhoid fever is to-day have been made plain and intelligible. (See modern investigations of Trichina disease in Germany and England, and the report on Charbon by Dr. Nichols in the present volume.)

The medico-scientific world is now profoundly impressed with the idea (we may almost say the belief) that zymotic diseases,

including all the so-called epidemics, are propagated by distinct particles, conveyed by air or by water. We need not call them "germs" or even seeds, or by any other name which would lead us into a labyrinth of speculation, involving doctrines of spontaneous generation and mysteries as yet unfathomable. It is sufficient to call them "contagion-particles" as is done by Dr. Burdon Sanderson in a recent paper of great interest published in the "Twelfth Report of the Medical Officer of the (English) Privy Council." No man has yet seen the distinct thing which, once introduced into the living body, produces such disturbance as to cause the symptoms of scarlet fever, or measles, or typhoid, but its real existence may be assumed from its observed effects, just as Leverrier assumed the existence of the planet Neptune before he saw it, or as chemists assume the existence of an elementary substance before its separation from its compounds.

The conditions and surroundings of typhoid fever in the period of its commencement are now more closely watched than ever before. The general result of this study on the opinions of the medical world has been to encourage the belief that in some way typhoid fever and filth stand in certain relations. There are as we before said many disbelievers, and they are men whose opinions cannot be lightly put aside. But out of this very widely diffused impression have grown various hypotheses, all based upon the propagation of typhoid fever by a poison as definite as that which causes vaccine disease, and all seeking to explain the nature of this poison and the manner of its introduction into the healthy human body. They may be thus divided.

First.—Propagation by drinking water made foul by the decomposition of any organic matter whether animal or vegetable, and specially by the presence in such water of excrementitious matters discharged from the bodies of those suffering from typhoid fever.

Second.—Propagation by air contaminated by any form of filth, and specially by privies, cess-pools, pigsties, manure heaps, rotten vegetables in cellars, leaky or obstructed drains.

Third.—Emanations from the earth, occurring specially in the autumnal months and in seasons of drouth.

We propose to see how far the evidence collected in Massachusetts corresponds with these hypotheses.

The first is essentially English. In reading the reports of typhoid epidemics occurring in England of late years, it so far predominates over all other imaginable causes that we are led to believe either that the English drinking-water must be exceptionally dirty, or that medical observers are unconsciously influenced by preconceived opinions based upon the ingenious speculations of men of ability who have directed their attention to this form of danger.

Dr. Snow of London investigated the causes of the propagation of cholera, and advanced the perfectly original although rather shocking idea that the disease was communicated through the discharges from the bodies of those suffering from this disease thrown upon the ground within the area of drainage of the water supply or into rivers, and thus conveyed in the form of drinking-water to the bodies of those in health. The history of the famous "Broad Street pump" in 1854, and the tracing of cholera from the water supply of different parts of London was strongly confirmatory of this doctrine. Many other observers have transferred this hypothesis to the propagation of enteric fever, and there is much evidence to make it probable. Dr. William Budd of Bristol has been conspicuous in its advocacy. He believes that typhoid fever is contagious, and that the emanations from the sick are the means of its diffusion,—that the affection of the bowels is the specific eruption corresponding to the skin eruption of other contagious diseases, and that the discharges from the intestines contain the specific virulent poison by which typhoid fever is communicated.

If this is so, if the contagion particles are given off in the discharges of the sick, and thus, through the drainage of soil, pollute the sources of drinking-water; certainly, if this mode of diffusing typhoid fever is the one most active, we should expect to find the disease most frequent and virulent where privies and wells are in closest proximity.

There are many large towns in Massachusetts where the surface of the ground is dotted all over with these structures. Lowell, Newburyport, New Bedford, among the most populous places, occur to us as examples. Every one familiar with the State knows that there are a very large number of towns with

a population of from five to ten thousand, compactly built, with no water supply except from wells, and no means of disposing of excrement except by privies, and we know from the registration returns that the people of these towns are more free from the pest of typhoid in proportion to population than the inhabitants of agricultural districts. It is impossible for us to believe that this would be so if water contaminated in the way referred to were the preëminent cause of this disease in Massachusetts. Our Lowell correspondent speaks of a well used by at least one hundred families, containing 52 grains of inorganic and 25 grains of organic residue to the gallon (see his letter for details), and yet the people using it seem to be even less liable to typhoid than others using water of better quality. It is true that he does not give us the experience of a long term of years, but the fact reported is evidently not in contradiction of professional experience in that very crowded city.

The testimony of Boston, as expressed in figures representing deaths from typhoid, ought to be far more positive than it really is, if the drinking-water pollution is the preëminent cause our English friends suppose. Old Boston, previous to 1848, was riddled with wells and privies, side by side, all over its limited and very crowded territory. Sewage contamination of drinking-water was inevitable. The water must have been continually charged with the products of decomposition, and even direct mixture of decomposing animal matter of the most repulsive kind must have been frequent.

Since 1848, the Boston water from Lake Cochituate has been almost as free and abundant as air, and (except, perhaps, from the influence of lead pipe) is of the purest possible quality. Very few wells are now in use, or have been for many years. We do not know of the use of a single one. Here are conditions to test the influence of drinking-water as a means of propagating typhoid, on a grand scale, and, for aught we see, complete. The result seems to be a diminution of typhoid, but in no very striking degree; only such a diminution as might be looked for if the purification of air rather than of water were in question. The sewers are now at all times discharging very large amounts of water, and carrying away from among us impurities which otherwise would linger in the drains. The sewers are more thoroughly washed,—and the people, too.

See also what our Winchester letter says of three years' experience of a foul well supplying water for seven or eight families, and with only a single case of typhoid among them in that period.

The testimony of Worcester and Springfield accords with that of Boston,—that is to say, typhoid is a less frequent disease since the introduction of pure water from without those cities, but the difference is by no means so marked as it would be if contaminated drinking-water were the prominent cause of the disease.

On the other hand, there is satisfactory proof that typhoid fever has been propagated in Massachusetts by drinking-water made foul in various ways. The letter from Sutton is exceedingly clear in its evidence on this subject. The boys' school at Pittsfield is another case in point. See also the Williamstown cases, and the letters from Huntington, Leominster, Leyden and Wrentham. Also the Maple Street cases in our Worcester correspondence.

Some of these are stated in a very general way, but others are so definite as to leave no doubt that the fever-poison was received through drinking-water.

The specific poisons of the zymotic diseases seem to be usually communicated to the blood either through direct inoculation, or as is much more frequently the case by mixture with the air we breathe, through which they are brought in contact in the lungs with the whole torrent of blood rushing through those organs.

Typhoid fever and Asiatic cholera, in so far as they are transmitted through the alimentary canal, are apparent exceptions to this general rule. The most virulent animal poisons of which we have any knowledge, as the snake poisons, syphilis (according to Ricord), glanders and charbon seem to be decomposed, or to lose their virulent properties, or to be unappropriated, when introduced directly to the stomach.

Typhoid poison however seems capable at times of resisting the power of rejection or of change which the stomach so often exhibits when noxious things have succeeded in passing the sentinels of sight and taste. Cases are reported in which it is impossible to doubt that the disease was received by absorption through the alimentary canal, but in the great major-

ity of cases occurring in Massachusetts in which causes can be traced, *air* (and not water) must be regarded as the vehicle.

We come now to the second class of probable causes of typhoid, viz. : propagation by air contaminated by filth.

The evidence is here still more direct. Among the most striking experiences are those given in the letters from Swampscott, Hadley, Watertown, Lexington and Marshfield. The Kearsage Avenue cases in Boston seem very conclusive on this point. Running through the whole correspondence is a recognition, more or less complete, of the agency of putrid air in causing typhoid fever. This faith is not universal, yet it seems quite general in the medical profession. There are those who see it plainly and express it clearly, as in the words of our venerable correspondent at Oxford : “ So firm is my belief of this (referring to exhalations from foul drains, cellars, privies and pigsties), that when I meet with a case of typhoid fever not readily traceable to some of these causes, I infer that *the truth has not been told me, or that my perceptive faculties have been at fault.*”

And this leads us to refer to the difficulty which is often encountered in tracing to its hiding place the real or probable cause of the mischief. A man almost instinctively resents the supposition that his premises may be foul. It is a kind of personal affront which a physician may well doubt the propriety of giving on mere suspicion, and without proof. A sensible man should, of course, receive such suggestions in the spirit in which they are offered, but, unhappily, all people are not sensible. But suppose suspicion to be excited concerning the state of a cesspool or a drain, or any other concealed structure, or even one only half concealed, like a privy vault. It is by no means an easy thing to learn their exact condition. The bad smell which they may emit is no certain indication (or, perhaps we should say, no certain measure) of their danger to health. There is reason to suspect that the fever-producing poison is odorless, and that, under certain circumstances, it may be set free from decomposing substances before the foul-smelling compounds of hydrogen come to give us warning.

The danger may be greatest when decomposition is (so to speak) going on under difficulties ; when it is impeded, suppressed, or imperfect.

But we shall have occasion to refer to this point again, as it seems to be of special significance.

A physician may suspect a connection between a sink-spout or a drain and the family well, but unless the water is offensive to the taste he finds it very hard to prove it without breaking up the ground with much cost and labor. He may suspect similar connections of conduits for air or water or both combined which would poison a family, but the work of tracing them is expensive and troublesome, and requires time and special skill which may not be at his command. It needs perseverance, and a kind of training to be got only by experience to unearth these half-hidden nuisances. Look at the history of the typhoid poisoning of a family in Watertown in 1868 in the preceding correspondence. The first examination of the drain proved nothing; the second was only partially successful; the third made evident the cause of the disease. If the proprietor of this house or his physician had been content with the first search the record of these cases would have come down to us, like that of so many others, as from "causes unknown and perfectly mysterious."

Our readers will observe that decaying vegetables in cellars are very often referred to in the preceding letters as among the causes of typhoid. It is the custom in the country to store potatoes and other vegetables for winter use beneath the dwelling. There is no reason to believe that this practice is harmful provided the vegetables do not decay, but in our long winters it often happens that partial decay cannot be prevented.

A generalization of many of the probable causes of typhoid referred to throughout this inquiry, is to be found in a single expression of our correspondent in Westborough, who says that he has witnessed a connection between decomposing matter and typhoid when the rotting material was *under cover*. This may be interpreted to mean only that the pestilential atmosphere is thus more concentrated, but we are inclined to believe that it signifies more than this. The air of a whole town like Brighton may be filled for months or years with the stench of putridity,—or, as our Brookline correspondent says, filth may be, at certain seasons, strewn upon the lawns so as to taint the atmosphere for weeks, or land may be covered with decaying fish, and yet none of these things produce typhoid

fever, as a general rule ; although we are not unmindful of the apparent exception to this statement in the epidemic following the fish-manuring at Mr. Webster's farm described in our Marshfield letter, and possibly also the fever described in our Provincetown letter. But instances are very numerous in the preceding correspondence where decomposition *under cover*, whether of a cellar or a drain, with a far less noticeable odor accompanying it than is often met with in the open air, or with no perceptible odor, has produced the most disastrous consequences.* Shall we ask organic chemistry to tell us what this certain something is which putrefying material gives forth under such circumstances ? As yet we shall ask in vain.

The third class of probable causes of typhoid fever may be considered under the general designation of *emanations from the soil*.

This includes a large number of well-authenticated observations by physicians, in which the fever-poison seemed to spring from the earth beneath or immediately around the persons affected. In some of these cases the ground was polluted by human agency, and in very many others it was only exposed to those causes by which vegetable matter, the natural product of the soil, was undergoing those changes through which it becomes that brown, pulverulent substance known as "humus," or "garden mould."

It is not always easy to separate these two agencies in the production of that condition of the earth with which the origin of typhoid fever appears to be, in some way, intimately connected. In both of them, however, *soil seems at certain seasons to afford the conditions required for the concoction of this subtle poison, and air to be the vehicle by which it enters the human body*.

Our correspondence is full of illustrations of this general fact.

The exposure of the bottom of ponds and reservoirs in the season of heat and the season of decay,—thus charging the air with the products of the decomposition of leaves, wood, and all

* Dr. Benjamin Rush ("Medical Inquiries and Observations") said sixty years ago, in speaking of miasmata exhaled from putrid vegetable and animal matters, that they are more destructive from articles which have been confined, than from those which have decayed in the open air. In the same connection he refers to the greater danger from the decay of *salted* than of fresh meats and fish.

forms of vegetable life mingled with whatever the soil may add to these products, or changed, as the soil alone seems to have power to change them—is, of all others, the most frequent single cause assigned for the production of epidemics of typhoid fever in Massachusetts.

It is referred to in our letters from Berkley, Brookline, Brewster, Coleraine, Dennis, Hadley, Harwich, Hudson, Kingston, Leverett, Mendon, Montague, Pembroke, Rowe, Southampton, Stow, Truro, Walpole, Waltham, Westminster and Hancock.

From Orleans and other towns on Cape Cod, we have similar testimony with regard to ground partially covered in ordinary seasons with mingled fresh and salt water, but occasionally exposed to the action of sun and air.

The effect of turning up soil in causing epidemics of fever is attested by our correspondents in Brookline (both as regards that town and Brighton), Concord and Leverett, and it may be questioned whether the cases described in our Pittsfield letter, as occurring to men who were engaged in laying drain-tiles in a meadow, may not fairly be classed with them.

The Ashland epidemic breaking out in houses just built upon land newly cleared and covered with decaying leaves may also fall in the same category. These cases, especially those of Concord and Brookline, surely point to some poison coming directly from the earth.

The singular difference in the liability of the people of Martha's Vineyard to suffer from typhoid fever according as they may happen to live in the eastern or western half of the island, will arrest the attention of all who are interested in the study of the causes of disease. It seems extremely improbable that the different water-supply can explain it, as is suggested by one of our correspondents on the island. The portion supplied by wells is in this respect like almost every other district of the same size in the State. There is however a broad distinction between the eastern and western half of the island in the character of the geological formation, and of the superficial soil. Professor Hitchcock's geological map of the State (1841) represents Martha's Vineyard in two portions, divided by a line running north-east and south-west, and corresponding very nearly with the line referred to in the preceding letters as

marking the boundary between the typhoidal and non-typhoidal portions of the island.* The western section is geologically unlike any other part of Massachusetts, and is described as corresponding to the deposit in Europe long known under the name of Plastic Clay, but now as a part of the Eocene Tertiary. It crops out in the cliffs of Gay Head, forming from the various colors displayed a remarkable and picturesque object well known to geologists. The eastern section is quite different, being composed like Cape Cod of diluvium or drift.

But the peculiarities of the surface are probably quite as important for our present inquiry as the underlying formations which are the special subject of geological research. In the western, or typhoidal section of Martha's Vineyard there are hills and valleys with abundant vegetation on a rich surface soil, overlying a stratum of clay. In the eastern, or non-typhoidal section there is a blank, level, barren expanse of sandy drift, perfectly pervious to water at all depths.

This combination of rich surface soil with a subsoil of clay has been elsewhere remarked in our letters as seeming to co-exist with typhoid. The high hill described in our letter from Newton had a "subsoil of tough marl," while the village had an "unfathomed bed of gravel." Fever occurred on the hill, and was almost unknown in the village. See also the letter from Rutland in which, although not fully explained with reference to this particular point, the circumstances would appear to be similar.

If we may suppose that a clay subsoil tolerably near the surface prevents the subsidence of materials undergoing decay to a point where they would meet the constantly moving current of subsoil water, it would seem probable that a ledge of rock would have the same effect. Our correspondents at Worcester, at Rockport, and at Beverly have remarked something of this sort. At Worcester there is a ledge thinly covered with earth, on which are built excellent houses, having all pro-

* The line of division on the geological map of Massachusetts runs from Muddy Cove near the northern extremity of Great Tisbury Pond to the southern extremity of Lagoon Pond.

The *Eocene Tertiary* includes all of Chilmark, two-thirds of Tisbury, and a little corner of Edgartown. The *Drift* includes one-third of Tisbury and nearly all of Edgartown. These two portions of Martha's Vineyard are of apparently equal extent.

visions for health and comfort, but typhoid is a more frequent visitor there than in other parts of the city.

In a manuscript report of lectures on continued fever by the late Dr. James Jackson of Boston, taken in his lecture-room about forty years ago, we find these passages. After speaking of the great obscurity of the subject, he says:—

“From analogy with intermittents, we are led to suspect the cause from local miasm, occasionally confined to a particular house, continuing perhaps six months, and affecting the members of the family successively.”

Dr. Jackson reports cases in proof, as follows:—

“A family moved from the country into a new double-house in Boylston Street, and were all attacked with fever. No visitors took the disease. None were sick in the other part of the same house, though both drank from the same well; and none were sick in the vicinity. No nuisance could be discovered, and yet we must suppose some local cause not offensive to the senses as in other cases, or else contagion, which last we have seen did not exist. Such family diseases often occur. Dr. Jackson had known thirteen persons sick in one family, isolated in the country. Sometimes the disease is limited to small districts; most often in Boston at the South End, and about Hartford Place and Fort Hill. Persons going to these districts take the disease, but persons removed from them do not communicate it. This must be caused *by some material in the ground itself*, not by the water or anything on the surface.

“Sometimes it pervades a whole city; it is then of a more mild character. Nor is this peculiar to thick settlements, but it occurs in limited districts in the country. An argument against contagion is that the fever breaks out in many different spots at the same time. Sometimes a very large district is infected, perhaps a hundred miles square, as was the case in the epidemic of spotted fever. In all cases the disease is confined to a limited district, and many are affected without any communication with diseased persons. So that all the cases of the disease cannot be attributed to contagion, and if most cases can be accounted for without contagion, it is probable that all may be.

“The cause of disease is *in the soil itself*, for if it was from the atmosphere, the disease would be much more extensive than if from

the soil, and even there it is very slowly developed. It rises indeed into the air, but is then so much diluted * as not to produce disease. The analogy with intermittent fever renders this probable."

In Dr. Jackson's published lectures (1825), after referring to the subject in similar terms to those just quoted, he says:—

"These facts taken together and compared with what is known respecting the causes of intermittents, create a probability that some emanation may take place from the soil capable of producing continued fever; yet, if this be admitted, it must be allowed that the material thus emanating is not known, the qualities of the soil from which it arises are not known, and the only advantage from the observation is to lead us to avoid the places in which fever prevails."

Certainly here is to a certain extent corroboration of the modern views of Pettenkofer to which reference has already been made. Pettenkofer says that when soil is "typhoid ripe" the disease appears; and that it becomes ripe through "organic processes" taking place in the earth. This expression is constantly used by him, but we have been unable to find in any of his writings on the subject any more definite explanation of the term. That he would convey the idea that these "organic processes" are the changes involved in decomposition seems evident enough.

It will be seen from the tabulated replies to the second question of our typhoid circular, and from the letters which we publish, that it is not possible as yet to know whether the same rule with regard to ground-water holds good in Massachusetts as in Munich—that is to say, whether the fall and rise of subsoil water corresponds with the increase and subsidence of typhoid epidemics. There can be no doubt whatever that the season when the level of water in the wells is as a rule very low from the absence of rain, is the season of typhoid fever throughout New England. A perfectly well-marked coincidence is here observable. Beyond this, the special ideas of Pettenkofer concerning ground-water have not been put to the proof.

* See the remarks of our correspondent in Dudley about *sleeping on the ground floor*.

A large number of correspondents assure us that in future epidemics the change of water level in the wells will be noted.

If we may imagine that the organic matter retained in soil near the surface under certain conditions of season and temperature gives rise, in the course of its return to inorganic elements, to some specific product as yet unrecognized by organic chemistry, we may see how the specific poison of typhoid fever may be generated.

The secrets of organic changes are for the most part hid from human eyes. Yet the poisonous aldehyde, produced under certain circumstances in the process of acetous fermentation is now well known. We may not despair of yet seeing the typhoid poison made equally manifest.

Physicians know that in the decomposition of the human body there is a period, soon after death, and previous to the evolution of offensive gases, when the fluids often possess poisonous properties. Dissection wounds are then far more dangerous than when decomposition has become advanced.

So we may find that when the decay of organic matter, whether in soil or anywhere else, has become evident to the sense of smell, the danger to the health of those exposed to it, in so far as that portion is concerned, may have passed its maximum. But these are mere speculations, to be overthrown or confirmed as science advances.

We have no disposition to enter at length upon so obscure a subject as the influence which may be exerted on health by dwelling upon special soils. Yet we cannot forbear to express our conviction that in this direction will be ultimately found an explanation of many things in the history of disease which are now mysterious. The property which earth possesses to render harmless the most revolting substances, a property known to the Jews from the earliest times and recently revived in plans for the disinfection of human excrement; the salutary virtues which fresh clods of earth are known to possess in removing animal poisons, as known to the Indians and to us their successors in America, and recently employed in the dressing of suppurating wounds; the influence which dwelling upon *wet* soil has been recently shown to have upon consumption; the influence (recognized in all time) which certain soils have upon intermittent and remittent fevers,—all these

observations point to *the earth* and the changes as yet unexplained which are there constantly taking place as the source of influences bearing directly upon our health and life.

The analogy between fevers generally known as miasmatic (intermittent and remittent) and the continued or typhoid fever of New England, pointed out by Dr. Jackson, becomes very significant when we look at the experience of practitioners all over the State with reference to the bottoms of ponds and reservoirs laid bare in the seasons of drought. These are the very places which would surely give rise to intermittents in our Southern country. Here they give rise to fever without remissions,—to typhoid.

Another analogy with intermittents may be seen in the greater liability to typhoid on the part of new residents, as referred to in our letters from Ashland, Fall River and Lowell.

Some of the possible influences of soil on health become more intelligible when we consider how much air it contains, and how readily this may become the means of transmitting anything which the soil may hold to those who dwell above it. A vessel of any sort filled with dry earth compressed as much as possible will still absorb one-quarter to one-third of its bulk of water without overflow. All this water represents space which has been previously occupied by air. If we look upon the soil as a kind of cover to what lies beneath it we must remember that the cover is not tight, that it is always partially open, and that whatever recondite properties the soil may hold, whether for good or evil, will be sure to come to the surface through the agency of air, which must change its position with the slightest change of temperature, such as must be occasioned by the alternations of day and night. Gases produced by decomposition must of necessity rise to the surface; moreover our houses are, in effect, bell-shaped enclosures, in which are retained with more or less completeness whatever the soil beneath us may have to render up.

On the question of the propagation of typhoid fever by contagion there is little new to be said, and what is old is contradictory. When two such authorities concerning the fever of New England as Dr. Nathan Smith and Dr. James Jackson differ in opinion on this point, we may be sure that it is one not readily settled. That typhoid is contagious in the same

degree as smallpox, measles or scarlet fever, no one perhaps would affirm ; yet many believe it to be communicable at times like erysipelas and puerperal fever.

Facts and opinions relating to the contagiousness of typhoid fever may be found in our letters from Dennis and Franklin.

The single continuous thread of probability which we have been able to follow in this inquiry leads uniformly to the *decomposition of organized* (and chiefly vegetable) *substances* as the cause of typhoid fever as it occurs in Massachusetts.

Whether the vehicle be drinking-water made foul by human excrement, sink drains, or soiled clothing ; or air made foul in enclosed places by drains, decaying vegetables or fish (Swampscott), or old timber (Tisbury), or in open places by pigsties, drained ponds or reservoirs, stagnant water, accumulations of filth of every sort, the one thing present in all these circumstances is *decomposition*.

And may not the influence of soil charged with vegetable remains, in the season of heat and of drought, be also referred to the same cause ? Although not yet proved, it is exceedingly probable that *a rich and fertile soil in which decomposable substances are retained near the surface by any cause, whether a clay subsoil, or a ledge of rock, or a protracted drought, is a soil favorable to the production of this special disease.*

The all-important question remains to be answered, whether, if these are the causes, typhoid fever can be avoided. With the single exception of such changes as may occur in soil through natural processes, all the various causes assigned are within human control ; they are indeed instances of human neglect ; of the omission of what all human experience has shown to be necessary for the preservation of the highest condition of general health. And standing in the connection they do to one of our most destructive special diseases, they but enforce the truth of the general statement that clean air and clean water are among our greatest blessings.

As regards soil, and the obscure processes, doubtless connected with decomposition, which seem at certain seasons, and under circumstances as yet ill-defined, to play so important a part in the production of continued fever, we are certainly far

less able to guard against its influence. Yet we are not quite so powerless in this respect as might be inferred from a passage quoted from the lectures of the late Dr. James Jackson. It is now more evident from what kind of soil typhoid fever springs.

The comparative exemption of crowded cities and towns leads us to believe that their more solid pavement, seldom disturbed, and free from vegetation, is a real protection against the emanations of the earth. Although those who live in the country are necessarily surrounded by open ground, they can have cellars thoroughly cemented,* and, in the season of typhoid at least, they can usually avoid sleeping on the ground floor.

We cannot more fitly conclude these remarks on the probable causes of the typhoid fever of Massachusetts than by again quoting one of the most original and far-seeing men of the last century, Dr. Benjamin Rush, who says: "To every evil the Author of Nature has kindly prepared an antidote. Pestilential fevers furnish no exception to this remark. The means of preventing them are as much under the power of human reason and industry as the means of preventing the evils of lightning or common fire. I am so satisfied of the truth of this opinion that I look for the time when our courts of law shall punish cities and villages for permitting any of the sources of bilious and malignant fevers to exist within their jurisdiction."

*It is greatly to be desired that some material more impervious to gases than hydraulic cement should be used for the floor of cellars in both country and city.

LETTER

FROM THE

CHAIRMAN OF THE STATE BOARD OF HEALTH,

CONCERNING

HOUSES FOR THE PEOPLE, CONVALESCENT HOMES,

AND THE

SEWAGE QUESTION.

LETTER.

BOSTON, December 10, 1870.

To the Members of the State Board of Health of Massachusetts:—

GENTLEMEN,—During the past summer, while I was residing in London, I thought I could not serve Massachusetts better than by investigating, as thoroughly as I could in the short time at my disposal, the homes of the London poor, and some of the means now used to improve them, together with some other topics of similar importance. The results have been of very great interest to me. I have therefore embodied them in this letter to you, hoping that you may regard my labors as not wholly useless in our important public work. The subjects may be divided into several sections, each of which is a distinct statement, and may be read without regard to its companions.

First. A night-stroll with a London police inspector, compared with a similar one taken afterwards in Boston.

Second. Operations of philanthropy, solely or chiefly as shown in the Peabody Buildings and Miss Burdett Coutts's Market, Reading-Room and Home at Columbia Square.

Third. The operations of the "Improved Industrial Dwelling Company;" or, philanthropy and capital united, with success to both.

Fourth. The Jarrow Building Company, by which a tenant becomes a proprietor of the home he lives in.

Fifth. Organized work among the poor, inaugurated by Miss Octavia Hill, assisted by Mr. Ruskin and others.

Sixth. A comparison between a model lodging-house, and a low tenement-house in Boston.

Seventh. Convalescent homes.

Eighth. The "sewage question" in England.

I.

A NIGHT-STROLL WITH AN INSPECTOR OF THE LONDON METROPOLITAN POLICE, AND A SIMILAR WALK IN BOSTON.

On the evening of July 20, 1870, I started with a friend on a walk through the purlieus of Whitechapel and of Ratcliffe Highway, two of the most noted thoroughfares of vice, poverty and crime in London. Our arrangements had been previously made with the chief of the Metropolitan Police. We were directed to report ourselves at 9 P.M., at the L— Street Station, there to meet Inspector G—. Prompt at the moment named, we appeared, and were graciously received by the chief of the station, who introduced us to our guide.

We had confidence in him from the first glance. He had a mild, but, at the same time, a fearless look, and his muscular powers were evidently such as to make him capable of coping with the roughest. After examining the station itself, its arrangements for the comfort and convenience of the policemen, and the cells for the prisoners, we started for the specific object we had in view, viz., inspection of the public lodging-houses of the poor and criminals in that part of London, and over which, in certain points, the police have an almost supreme control.

During that long walk from 9 P.M. until 2½ A.M., I met with persons and events of the deepest interest. We visited the lowest dens of private degraded poverty and crime, and strolled leisurely through whole streets in the "thieves' quarter," so called because occupied by these prominent members of "the dangerous classes." We saw women and children working at dead of night under the bright gas-light of the obscure and filthy courts in which they lived. We found an orphan girl about 14 years of age thus toiling for a mere pittance, to support three younger brothers and sisters. We followed closely in the steps often before trod by Dickens, and saw the opium-smoking hag he has so graphically described in *Edwin Drood*. She blew out before us, as before the great novelist, huge blasts of smoke

from her broad animal-like nostrils, as she lay in a half-dreamy state across her filthy bed. In one dark alley, so narrow that our party went in single file, and I was the last, I observed a little girl flitting around me, and while scarcely able to see them, I felt her tiny fingers fly about my pockets with a lightness, and an exquisite delicacy of touch, worthy of one of Fagin's most apt scholars. Though I knew she would be unsuccessful, because, foreseeing such an occurrence, I had carefully emptied every pocket, nevertheless, the sensation was anything but agreeable during the few moments I felt the process going on in entire silence, and almost complete darkness. Almost everywhere in these dark passages were dimly seen or heard, dusky human beings lying or sitting, sleeping or talking in undertones. At times they were sauntering about as if the night hours were their "opening day," and home was no place for them. Indeed, the private houses into which our guide led us, were wretched and filthy enough to drive away any one not wholly lost to decency and cleanliness. Our walk culminated with a bloody assault made by a noted bully upon a young girl, probably some poor outcast, who having no proper home in which she could rest, was flaunting out in one of the narrow streets of the "thieves' quarter," as late as when the morning was just breaking. We entered and examined one of the public lodging-houses, where the poor, vicious or criminal congregate at night, and which, for the past few years, have been under the strict surveillance of the police. Any man has a right to open one of these houses, but he must do so in strict conformity to law, and be constantly inspected by the police. We saw one house capable of receiving three hundred males. We stumbled up the clean, but uneven and rather circuitous staircase, and entered a large room nearly filled with single and narrow cots. Many of them were occupied with stalwart men. In the dim light of a low gas-jet their half-naked forms looked Herculean, as the men either slept unconscious of our presence, or hastily drew up the covering which the warmth of the night had induced them to throw off. Every such public house is obliged to be kept clean, and to provide at least three hundred cubic feet of air for each lodger. Usually there are passages for ventilation permanently opened in the walls. Plenty of water and numerous wash-basins are found below. Immense kitchens,

with their perpetually burning fire in the grate, afford to each lodger the means of cooking his meal. In one of these houses, occupied by known thieves, nothing easily portable is seen. Even the brass stoppers of the wash basins have disappeared,—a bit of cork, having no real value, alone remains. No knives or forks are to be found; they have been stolen, and no new ones have since been bought. In such lodging houses, whether in the “thieves’ quarter” or elsewhere, 3d. per night is the price for lodging, or 18d. per week.

One or more lodging houses we visited in which both sexes are admitted. Theoretically, only married persons are admitted, and each couple has one pen so to speak, allotted them for 6d. per night. That is, a large room is divided into compartments just big enough to hold a double bed, and to allow a small space in which to move around. Each partition wall is about eight feet high, but not reaching to the ceiling, which gives in a general way some circulation of air. One cannot be sure that such places may not be used at times as assignation houses. But there is little danger of this difficulty becoming very common, for over these, too, the police have despotic control; and a house would be closed that became infamous for prostitution when intended simply as a healthful lodging house. Long after midnight our walk continued. About a quarter to one A.M., our guide rang the bell of the “Casual Ward” of the district. Similar places, under the same name, are now found almost everywhere in England, and usually in connection with the union poor-houses.

Wherever in England a houseless wanderer appears at night, there will these evidences of Dickens’s generous heart and all-powerful pen be found ready to receive him. They have their origin in the fact that he, in the very locality where we were then standing, had, during one of his midnight strolls with the police, seen many persons lying one cold night on the doorsteps of the Union Workhouse,—they had been refused admission even there, “because of want of room.” Dickens’s feelings were enlisted, and he used most efficiently his voice and his pen, until, by law, every man, woman and child in England who needs shelter can claim at least for one night, lodging, a supper, a warm bath and breakfast next morning, and perhaps some articles of new clothing are given if those used before entrance

be ruined or contain any "contagium" that will be injurious to the public health. In payment, a certain amount of labor is performed if required.

The porter soon responded to our summons. We examined everything about the establishment. It was of that exquisite neatness and cleanliness so peculiar to England. The bath-tub was as white as the driven snow; the beds were compact and clean; the floors without a trace of dirt. In the reception room we saw the signature made by Dickens at his *last* visit to the spot, only a very few months before his death.

In conclusion, I will express my admiration for the way in which English law,* and its official, who accompanied us under that law, deal with the public lodging-house system of the poor, and with the poor and vicious themselves of London. The rooms and walls of some of the buildings used as common lodging-houses in Whitechapel, are as clean, if not so fine, as those of many a palace, or humbler English home. At present the law does not feel at liberty to be so despotic in regard to the English working-man's *private* home. If he choose to have filth in his own premises the law does not usually prevent it. It is his castle, and therefore sacred to private right,—a most noble maxim indeed, unless it be carried too far. I believe the time will come in England, and in Massachusetts also, and it will come with the consent of the whole people, when the community will feel that an impure moral or physical *private* abode is a nuisance and crime against humanity, as much in quality if not in degree, as the filthy, ill-ventilated public lodging-house, and as such, it will be abated, if need be, by law.

Again, this thorough police inspection of public lodging-houses of the poor is the commencement of a great sanitary reform. It is complimentary to the many private enterprises for improving the houses of the people, as now carried on by private charity, or by enlightened capitalists.

Before examining the private London enterprises to improve the homes of the poor, we must compare my experience during a walk with the police of Boston with this which I had in London. Some captious person may exclaim: Why tell us about London purlieus and England's "thieves' quarters," and

* Appendix A, for summary of English law on Common Lodging-Houses.

other abominations and her laws? Have we any such places, and do we need any such laws? To such a critic I would say: Come with us in our walk *with the police in Boston's* "highways and by-ways."

I shall be surprised if the critic, after the perusal of the following account of our walk in *our Radcliffe Highway*, does not see some reason for my details upon the abominations of London, and still more for my account of the efforts recently made by English law, and by private and public charity and capital to relieve these abominations. The very similarity between London and Boston in one respect, viz., in the wretchedness of the houses of the poor in both, and the contrast between the two cities in their relative action, tending even partially to relieve that wretchedness, will I think, suggest topics worthy of serious reflection by every man and woman in the State.

At 8½ P. M., of Dec. 1st, 1870, we* met by previous appointment at the Hanover Street police station. Our guide not having arrived we sat a half hour, and during that time, a well-dressed but drunken woman was brought in reeling, and she was forthwith transferred to the cells below. Soon afterwards a man who said he was about 50 years old—a "worker along shore," and who got his meals "here and there on the street once in a while," and who "had no home," claimed a lodging. He was kindly received, but I saw none of the paraphernalia of Dickens's Casual Ward, and no food is usually given.

The station, in every respect, is superior to that at L—— Street, London, both for the police and the prisoners. This was probably owing, in some measure, to the fact that the Boston station was built for the purpose, whereas that in London is an old building, aristocratic looking, it is true, with its sweeping and ornamented staircases, and its large rooms. But they are not adapted to the purposes intended, even in that portion occupied by the police; and in others where the prisoners were kept they were rather crowded. The Boston station, however, I do not think, in some respects at least, entirely proper for human beings, however degraded, to be compelled to stay in even for a short time. The cells are in the cellar. They seem clean. The outsides of them are scrupulously nice. The com-

* The Secretary of the Board, Dr. Derby, had previously made arrangements with the Chief of the Police. We went together during the evening.

forts for passing the night are very small. Four persons can be shut in one room. Four *bunks* are arranged in some, and these are made of strips of thin iron about an inch wide. At the head these strips are sloped, apparently to serve as a pillow. No mattress or even straw to lie upon, or covering of any kind were visible. The whole cellar at the time of our visit was heated intensely by means of steam, or hot-water pipes. "We have no blankets," said our guide, "so we have to keep the room warm." The earnest appeals for cold water from the various cells were quite striking to us strangers, and the behavior of one of the prisoners when the cell door was opened, was quite suggestive of suffering undergone. Hastily, and without waiting for the ceremony of a cup, he ran towards the pipe, and bending down with his face turned upward, and his mouth distended, gulped down a long draught of Cochtuate from the open water-pipe. It was like the long draught of a thirsty animal taken from some running stream during the hot noon-day.

Soon afterwards we started on our walk and almost immediately entered Stone's yard, where about a year ago a murder was committed. Our guide lighting a bit of tallow candle which he carried with him, led us up a broken and dirty staircase, which, for its filth and dilapidated condition, was quite equal to anything I saw in London. In the chamber of murder we found a mass of extreme wretchedness. A young man was crouching beside a hot hard-coal iron-pot stove, while another, a red-eyed, sinister and dogged-looking youth, was seated apparently for want of any better place, on the foot of a nasty bed. One old woman was gleaning with her skinny fingers bits of coal from a mass of half-burned ashes and cinders, while another stealthily looked at us from a corner where she sat upon the floor. I felt quite secure with our guide, but I should have shrunk from being there alone at night. "How came you here?" asked our guide of the red-eyed individual above alluded to. "I came to visit that man," was the only and curt reply. "And who is he to whom you spoke?" I asked, after leaving the filthy spot, and getting into the open air. "He is a thief, and has no other business. He is not a bold operator. He steals little things, here and there. He loves to rob drunken men when they are asleep upon the sidewalk or door-steps, and

sometimes he makes a fine business of it. One of the prisoners you saw this evening was found drunk, and with over two hundred dollars in his pocket." The passage-way leading to this court, and the court itself, are simply infamous with their stinks. That sharp, Saxon word alone expresses the thought I wish to convey. The privies were filled to overflowing, and covered with nastiness to the extent of two or three feet from the seats, when I visited and inspected them six months ago, and from what our noses and our eyes, with the aid of our dim light could perceive, there has been no improvement in the interval.

In these passages were passing and repassing several persons, young and old, male and female, apparently peering at us intruders in their private premises, and yet how did they stand with relation to the landlord of these filthy abodes? As our guide informed us, the rent is rigidly exacted, and if not paid the scanty furniture is summarily pitched out into the filthy passage-way, and the tenant is ejected. My indignation is excited to think that the city authorities allow even one such tenement to remain to taint the atmosphere, both physically and morally, of the whole neighborhood, especially when we have laws stringent enough to abate this and many more similar nuisances that are scattered here and there in Boston. More especially am I indignant to think that some of these houses are at times owned by men living in luxury, in our most fashionable places, men moving in political power, nay men of irreproachable religious *appearances*, who talk of Christianity, and perhaps listen with becoming gravity to the beautiful teachings of the Sermon on the Mount, Sunday after Sunday.

These men will either themselves, or through some paid agent, receive of the landlords who sub-let these hells on earth, the hard-earned pittance obtained by vice or crime perpetrated by the denizens of these filthy tenements. While in London I heard from what I deemed good authority of nobles of the land fattening on the price gained by whole streets of brothels, and even some ancient ecclesiastical establishments, surfeited with the wealth which land in London gives to every large proprietor of it, have not, it was said, quite clean skirts in this particular. Similar men and similar buildings exist in Boston. Public opinion ought to condemn such persons and such buildings as I

have described in London, and shall still further describe as seen during this walk. But neither Old nor New England at present cares to do so. Every one has a right to let his own house as he pleases. If he choose to sub-let to a Carker, or even a Fagin, no one can complain. He may, week after week, shut his eyes to the real cruelties and enormities perpetrated on his own premises, provided only that the fawning agent will pay into his patron's already overflowing coffers the rent justly (?) his due. This may seem hard language ; nevertheless I believe it strictly true. Public opinion should bring such landlords to strict social justice, and the public law should summarily abate the physical nuisances on their property. But let us walk on. Every other house in certain large parts of North, Cross and Richmond Streets has a dancing hall connected with it. We visited several of them. Nothing improper in the behavior of the inmates was observable. In one place blacks and whites were mingled in the mazy waltz, and the gentle whirls of the dance, as performed by a beautiful white girl of about sixteen, with her negro partner, presented nothing (save in that union) that would have been inconsistent with society as seen in any of the palatial residences in the Commonwealth or Fifth Avenues of Boston or of New York. Bars stand near each dancing room, and after the dance is over those engaged pay ten cents and "treat" their partners, I was glad to see not to intoxicating drinks, but to milder beverages. The proprietors of these places know their own interest too well to allow of liquor being sold. That would produce riot, and riot would soon close the establishments. The proprietors know the varied allurements, strange as that word may sound, of these places are enough without dram-drinking, and as I watched the dance going on, I thought that possibly it was the only ray of real pleasure that shines down upon at least some there who were engaged in it. The young love to dance, and the child trips with her feet to the sound of music as naturally and as gleefully as the lamb skips under sunny skies over the greensward. The act of itself is harmless, though Puritan religion formerly condemned it as always fraught with evil. It may be sanctified to virtue and to the highest amenities of human life when used legitimately within the precincts of home. Those living in these places, however, have no proper home. Many of the lodging

places are simply horrible. To know this, stoop with us, and crawl cat-like down this dark cellar-way, and see a *home* in Boston! This cellar room is scarcely high enough for us to stand erect. One can easily almost touch each of the four sides while standing in the centre of it. The floor is dark, dirty and broken; apparently wet also, possibly from the tide oozing up. Two women are there, commonly, yet rather tawdrily dressed, and doing nothing but apparently waiting, spider-like, for some unlucky, erring insect to be caught in their dusty but strong meshes. Tubs, tables, bed-clothes and china ware, are huddled incongruously together. Our guide strikes a match by the stove, and then opens a door into a so-called bed-room. It is a *box*, just large enough to hold a double bed. No window is in it, no means of ventilation, save through the common room up the cellar steps. The bed is of straw, covered only by a dirty blanket. Everywhere is the picture of loathsome filth. The stench, too, of the premises is horrible, owing to long accumulated dirt, and from the belching up of effluvia from solutions of dark mud, reeking with sewage water from the city drains and water-closets. It is difficult for us to breathe in the tainted atmosphere. We feel ourselves enveloped in a physical atmosphere most horrible, and a moral one most degraded. We glance into another "bed-room!" opening by another door into this common room. It is a fac-simile of its neighbor. Upon the dirty blanket lie recently washed and finely starched wrist-cuffs, and the jaunty modern hat and feather now worn by all. The strange contrast between fashionable neatness and exterior properties of appearance with supreme nastiness was never more strongly manifested. "How much do you pay for these rooms?" we asked as we turned to leave. "Four dollars a week!"

"Take care of your heads" said our guide, as we again, in single file, crept up the cellar stairs, and tried to breathe again freely in the open street, after stooping low to avoid the blow we should inevitably have received if we had walked erect. "Yet," quietly remarked our guide, "in just such places, strangers, men of respectability from the country, go and lose their money and their watches, and then come stealthily to us begging us to regain their property without bringing shame on themselves." What a revelation! I saw no worse home in

Whitechapel. I even doubt whether any so bad can exist under English law. And this was not a solitary example. We visited several of the same type. If any faith can be put in the idea of an overruling, retribution-paying Justice ; if any confidence can be placed in all the deductions of modern sanitary science, Boston will sometime suffer the heaviest of penalties for its great guilt in these matters. Nay, is it not even now suffering the direst of calamities in the deleterious influences exerted on every child born within such dens ? In one place, while our guide, with the usual nonchalance that long possession of known and acknowledged authority always gives, was lighting his candle, a woman earnestly called out, "Please take care and don't wake the baby." "Oh, no," replied our guide in kindly tones, "the baby shall be taken care of." Following his light, we with difficulty ascended a very narrow and broken staircase leading from the cellar to a chamber, if it might be so called, above. It was of an irregular shape from three to five feet broad, twelve to fifteen long, and contained three beds. One of them was a small one and on it lay a beautiful babe about six months old. Its little arm was lying outside the dark and soiled bed-clothes ; its dimpled fingers were as delicate and beautiful as a child's alone can be. It was calmly sleeping in that den of all uncleanness, unconscious of its future fate. And how hard must inevitably be its fate, it was plain enough to foresee. Born amid the haunts of vice and crime, bred in filth, how could it ever know, at least in its tenderest years, the sweet delights of a clean and happy home ? What more natural than the thought which arose uppermost in my mind while looking down upon the little sleeper, "Would that you had never been born. Here you are, beautiful of form, and with all the capacities perchance of an archangel for intellectual development and for moral worth. Yet what chance have you, in this fierce struggle of life, of gaining either ?" One might as well hope to train up a California pine in the darkness of a cellar, while bruising each hour some tender shoot as it is struggling towards the light and air of heaven, as to raise a child to perfect physical health, real learning and virtue in such a spot. And yet such spots are numerous in Boston. Proud is our city and justly so of her churches, her religious freedom and her public schools. But of what use are

her churches, her freedom and her schools to those of her children, whom she allows to grow up in such places as these I have attempted to describe. All these advantages are a mockery even and a snare; for while we piously exclaim, "See how good and learned we can make our citizens," at the same moment, we are allowing such evil influences to exist broadcast amongst us. I am not such an optimist as to believe that we can root out all vice by building houses, but I do contend that if for no other purpose, for the physical good of the persons themselves, and for the safety of the public health, nuisances like this vile abode I have attempted to describe should be summarily dealt with by the law, and that better houses should be everywhere erected for the people, even the most vicious and degraded. Where are our lines of Peabody, Burdett Coutts or Waterlow buildings; our "Casual Ward" or our cheap public lodging houses, with plenty of air and fresh water given to every one by the law of the land? Where are our "organized workers among the poor"? For sanitary if not for moral reasons would I urge these questions warmly home upon our citizens individually, and upon the public authorities.

II.

OPERATIONS OF PHILANTHROPISTS FOR THE IMPROVEMENT OF THE DWELLINGS OF THE POOR IN LONDON.

Under this head I shall allude to the Peabody Buildings, and to those erected by Miss Burdett Coutts.

I fully concur in the following words emanating from three eminent men of Great Britain, viz.: Dr. W. T. Gairdner of Glasgow, Mr. Rawlinson and Mr. Druit of London.

Dr. Gairdner says: "On whatever other points sanitarians may differ, there is a remarkable concurrence of opinion as to the primary need of improved house accommodation for the lower classes." (Remarks on the Sanitary Condition of Glasgow.—*London Lancet*, Oct. 15, 1870.)

Mr. Rawlinson, in his address before the recent Social Science meeting at Newcastle, stated in rather strong, but I think true words, that "defective house accommodations produce disease, immorality, pauperism and crime, from generation to generation, until vice has become a second nature, and morality, virtue, truth and honesty are to human beings so debased, mere names."

Mr. Druit (address at the meeting of the Association of Medical Officers of Health, as reported in *Medical Times and Gazette*, Oct. 22, 1870): "For myself, I do not hesitate to avow my belief that, for the dwellings of the laboring classes in cities, provision must be made by public authority."

A philanthropy, which raises a man's self-respect and not a mere charity (which usually lowers it) lies at the basis of the operations seen in the Peabody and Burdett Coutts Buildings.

THE PEABODY BUILDINGS.

The world knows the fact of their establishment in London by the late Mr. George Peabody, who gave £500,000 as a fund for that purpose. In his letter to the trustees, he writes that he wishes "the fund or a portion of it to be used in the construction of such improved dwellings for the poor, as may combine in the utmost possible degree the essentials of healthfulness, comfort, social enjoyment and economy."

I have visited and examined carefully all the buildings at present erected, I have conversed with the superintendents of each, and will here give a general summary of the results of these inquiries.

There are five series of houses, viz. : at Chelsea, Spitalfields, Islington, Shadwell and Westminster.

The following table shows the number of buildings and number of families that can be received, and the general rates of prices per week :—

PLACES AT WHICH THE BUILDINGS ARE ERECTED.	No. of Buildings at each.	No. of Families each can receive.	PRICES.			
			One Room.	Two Rooms.	Three Rooms.	Two small Rooms.
Chelsea, . . .	4	136	2s. 6d.	4s. 0d.	5s. 0d.	- -
Islington, . . .	4	165	2 6	4 0	5 0	- -
Spitalfields, . . .	*	58	2 6	4 0	5 0	- -
Shadwell, . . .	4	200	2 6†	4 0‡	5 0§	3s. 6d.
Westminster, . . .	3	175	- -	- -	- -	- -
Total, . . .	.	734	- -	- -	- -	- -

* Spitalfields buildings are built on an irregularly shaped lot of land, in a great thoroughfare, and therefore cannot be compared with the others.

† Reduced lately in consequence of trade falling off, to 2s. 3d.

‡ Reduced lately in consequence of trade falling off, to 3s. 3d.

§ Reduced lately in consequence of trade falling off, to 4s. 3d.

No tenant can enter the buildings if he receives more than thirty shillings weekly. It would thus appear that these buildings are intended for the poorest. They are scattered in various districts of the metropolis. Some are more in demand than others. Westminster, for example, is constantly full, with applicants in advance. Shadwell, on the contrary, though of most palatial grandeur and with fine appointments, has recently lost several of its tenants, because trade (in ship building), which was very brisk a few years ago, has now wholly left the Thames, in consequence of the persistent strikes in which the workmen on the Thames have indulged. The trustees have, therefore, felt obliged to reduce the rents of all these rooms, and one-quarter of them, at the time of my visit, were unoccupied.

With the exception of Spitalfields, which being on an irregular and rather confined thoroughfare, is of an irregular shape, the groups of buildings are all erected in a rectangular form, with broad intervening spaces, allowing free access of light, sun and air, and at the same time, in the centre is a playground for the children. The surroundings and the passages are all very neat, and generally paved, either with flat flag or flint stones, and in one instance simply covered with gravel.

In these, parties of laughing children are almost always playing. None from the outside are allowed to enter.* To one standing in these squares, the buildings present not only a very neat appearance, but some of them (Westminster and Shadwell) have an air of real grandeur. Moreover, the enthusiasm of almost all the occupants of the rooms for the cultivation of flowers, which of late years seems to have become a real passion with the English people, increases the beauty of the building, as some most brilliant displays of blooming plants are made from many windows. If the scene at times becomes very striking and picturesque even to the eye of the casual visitor, so it must have a benign and refining influence upon all the inhabitants of the place.*

A small black or bright brass knocker is upon each family's door, and it was touched by the superintendent with as much deference, when calling upon the occupants, as if he were tapping upon a street door in Belgravia or of Beacon Street. The Peabody Trustees evidently mean that every man shall consider himself as really at home, when he enters their buildings, as if he occupied a palace at Hyde Park. The deportment of all the superintendents in this wise impressed me very favorably.

The rooms were clean, and the various arrangements for cooking were admirable. The houses have long corridors running directly through the centre and along the entire length of each story. These corridors communicate with a central staircase of stone steps. The ceilings are not very high, and the corridors are ventilated and lighted by a window at each end and partially by the central staircase opening. There are two water-closets at each extremity of each corridor. All the front doors open on these same passages. Hence I should fear two results may, at times, happen deleterious to health. Unless great care be constantly taken, the passages may gradually become soiled. Filth may accumulate and noxious vapors arise from the water-closets, provided they are not strictly and daily washed, or oftener. In case of an epidemic it would be impossible to isolate completely any apartment, as the front door of each opens into this general pathway. The reply to these objections is that the care taken hitherto has prevented

* Societies are formed in many parishes to promote this object, and prizes are given for the best specimens of the most common flowers.

malaria from the water-closets, and no epidemics have as yet ever appeared in either of the houses, although at times diseases have prevailed extensively in the immediate neighborhoods. The attics are used, in common, as large washing, drying and bathing rooms. This community of goods in other places usually does not succeed well. Finally, I cannot think that the universal custom of leaving the brick walls and partitions uncovered, save by a white or colored wash, is agreeable to the eye, or can be so *homelike* as others covered with neat paper, &c.

In making these brief criticisms I trust that no one will deem that I undervalue the magnificent plan of the benefactor, or would throw the slightest shade upon the labors of the trustees. They are both beyond praise. But if any one in Massachusetts thinks of imitating this great act of benevolence, and seeks for light from these buildings, let him consider these points and compare them with the views of Sir Sydney Waterlow and Mr. Allen, which I shall give later in this letter.

I conversed long and freely with each superintendent of the Peabody Buildings. The resumé of the whole may be made as follows: Sickness is very rare. Epidemics have not raged inside, though, at times, prevalent immediately outside of the buildings. The general care of personal appearance of each tenant improves. This is remarkable, chiefly in the women and children. In some instances (as the superintendent at Shadwell remarked), the change in men is "wonderful; miraculous." A drunkard, slovenly and dirty; a husband, neglectful of wife and home, under the influence of the silent example of his neighbors in these buildings, and from his own growing self-respect, became careful of his person, and his evil habits of drunkenness left him. He was literally a man *renewed*. Many, from being quarrelsome when drunk, have, without giving up wholly their bad habits of drinking, learned to sufficiently restrain themselves as to become less offensive to family and neighbors. Knowing that, according to the strict rule laid down by the noble donor, no one will be allowed openly to be vicious, he hides the fault, and that is a great deal, at least for others even if it be less than one could wish for himself. The influence on children is almost constant. They may enter the buildings uncleanly and with torn garments. But they rarely

remain long so. Maternal pride and the stimulus applied to it by the desire of the child to appear as well and as neat as its playmates, work wonderful cures. There are some however who are incorrigibly wrong-doers and filthy, and some whose nature seems to need an occasional broil. An extremely dirty tenant, or "a weekly fight," said one of the superintendents, "I cannot allow, and I have had to discharge some, though very rarely, for their filth or their brutality." Discharges for nonpayment become less and less frequent. The sense of independence on the part of the occupants is often most ludicrously shown. Some refuse even favors, such as the purchase of coal at wholesale prices through the intervention of the superintendent, preferring to buy according to their "own sweet wills," even if they pay higher!

One superintendent informed me that very absurd stories were propagated about the rules and regulations of the buildings when first opened. It was currently asserted that every one must give up a little of his manliness if he entered as a tenant. Hence, perhaps, has arisen such insane protests as that above described, instead of a *real* manliness of character.

The result of my whole examination has been that of great admiration. The influence of these buildings for good upon the health, physical and moral, of the people residing therein, is immense. They are like oases in the desert of miserable, dark and dirty abodes such as I saw among the separate residences of Whitechapel and of Radcliffe Row. They are immeasurably superior in every respect to the public lodging-houses so cared for by the police, and of which I have already given some account in my "Night Stroll with an Inspector of the Metropolitan Police." Wherever hereafter an inquirer may ask about ameliorating the dwellings of the poor, there will the name of George Peabody be mentioned with respect and love; for be it remembered that institutions managed as the Peabody Buildings, are almost purely philanthropic. The percentage for rents on the original outlays is so small that no capitalist would desire to employ his surplus funds without greater gain. We must look in other directions for plans and successful experiments in which philanthropy and capital join hands.*

Before closing wholly these remarks I cannot forbear repeat-

† See III. Reports of Improved Industrial Dwelling Company.

ing a remark made by one of the most eminent of London capitalists, one who perhaps more than all others has labored in this cause of raising the homes of the people. The remark was made to me when speaking of the Peabody Buildings : “Excellent as they are, how much more good would have been done, and how many more families would have been placed in healthful homes if, instead of building these large and expensive tenements, the fund had, in part at least, been spent in the purchase of suitable sites which might have been let at such *low ground-rent* as to induce capitalists to build houses according to certain specifications to be laid down by the trustees.” The more I reflect on the subject the more reasonable seems this suggestion from the London capitalist.

MISS BURDETT COUTTS’S MARKET HOUSE, LODGING HOUSE, AND
READING ROOM AT COLUMBIA SQUARE.

I know of no place which displays more the union of fine taste, with philanthropic zeal and Christian feeling, than these grand works erected by Miss Burdett Coutts for the people resident near Columbia Square. Columbia Square seems exactly the spot for such a series of institutions. In my walk to it I passed through streets filled with houses of an inferior kind, and out of which flocked troops of lively children, who evidently were born in the most humble life. Many of these legions of children seemed to be checked by their hard fate in some of the sweetest attributes of childhood. They were often thin and rarely clean, and although on many of the countenances was the peculiar bloom of young English life, the average of physical health was far less than would have appeared in any similar number of children growing up under happier auspices. Hence it seemed that Miss Coutts had wisely selected the spot for her philanthropic object.

The market-house covers a large open square, and is entered by various gothic arches of medium height. Small shops, and an inn (over the front of which appears an inscription to the memory of Sir Francis Burdett), occupy the basements of the quadrangle. In the open space of the quadrangle, at certain parts of the day, congregate the buyers and sellers. Over the various arches, and cut in the stone, appear mottoes, some of them taken from the Bible, and all appropriate for the place, and to be

plainly read by all ; for example, " The earth is the Lord's and fulness thereof, the world and they that dwell therein ;" " Speak every man truth with his neighbor ;" " Study to be quiet and do your own business ;" " A false balance is an abomination unto the Lord, but a just weight is his delight." The " practical" man may doubt about the value of these mottoes ; the sceptic may sneer ; the positivist complain of them as savoring of what he calls a bygone superstition—and finally the capitalist, as he wants to make money, would exclude the whole of them, and with them perhaps all the other graces that abound in the building, on the ground that they do not " pay." Nevertheless, I honor the filial piety, the æsthetic taste and the generous philanthropy that led Miss Coutts thus to shower, as it were, beauty and holy thoughts over the common ways and actions of the people and of their children. When that gentle lady is no more, thousands of hearts will bless her for the sweet impressions daily given them in their childhood and youth by the market walls of Columbia Square.

Adjacent to the square is a large hall, two stories in height, but really only one hall with four galleries, two on each side. Round tables are in each, and the newspapers of the day are there. One halfpenny is charged for entrance into this almost palace-like hall, with its polished granite columns, and, in summer, with its baskets of blooming flowers, its brilliant gas, and its numerous conveniences for reading, writing, playing chess, chequers, cards, eating, and even, in one portion, for smoking. I went into it and found most of the news I should have read at a club house. A number of persons were in each compartment. I regret to say that such a place evidently could not " pay." Nevertheless, it attracts by its cheapness and quiet, and prevents some, perhaps, from resorting to the dram shop, where, heretofore alone, the poor have been obliged to go for relaxation from daily toil. Therefore I hail it as one of the prophecies for the future health, moral and physical, of the people.

Directly behind the market and reading room, stands the lodge or home for the people.

It consists of a rectangular block of four handsome brick buildings, finished with stone. A very graceful clock-tower rises in the middle, which is surrounded by a small flower garden, the whole producing a very picturesque appearance.

The houses are built much on the plan of the Peabody Buildings, and should receive the same commendation and the same criticisms. I observed that the blue-tinted bricks of the walls look more pleasantly in the rooms than the plain white or lighter colors. The superintendent reports the same results as in the Peabody Buildings about freedom from epidemics and the improvement in the deportment of the inmates. He has known cases of intoxication radically cured after residence there. There is an evening school connected with it, and lectures are frequently delivered in the hall adjacent to the market. His rules for cleanliness are to brush out daily, wash up weekly, coloring of walls every three or four years. The prices range as follows :—

For one room,	2s. per week.
two rooms,	2s. 6d. or 3s. 6d.
three "	3s. 6d. or 4s. or 4s. 6d.
four "	4s. 3d. or 4s. 6d.
five "	5s. 6d.

He receives any one who applies, but first examines his actual residence and gets references. It differs in general principles from the Peabody Building chiefly only in receiving those as tenants who may earn more than 30s. per week, above which the latter does not go for tenants.

III.

**"THE IMPROVED INDUSTRIAL DWELLING COMPANY," OR THE
UNION OF PHILANTHROPY WITH CAPITAL, AND WITH
PERFECTLY SUCCESSFUL RESULT TO BOTH PARTIES.**

A thorough insight into the operations of this company is all-important for all who desire to know how to erect good homes for the people. In Boston, the experiment has been successfully tried on a small scale. Two or three model lodging houses

have been built, and have done good to a few families, and at the same time they have returned six per cent. interest on capital over and above all incidental expenses. But nothing has ever been carried out on so grand a scale as by the above named company in London.

Whilst the Peabody and the Columbia Square Buildings do not pretend to pay more than the smallest return to capital, the buildings of the Industrial Company give such ample returns that the directors have refused (because so fully occupied with erecting new buildings) to receive more money for the present year. While the former cannot give an entire home and separate water-closets, washing-room, &c., to each family, the latter have contrived to do so, though at a somewhat higher rent. Nay, it is one of the cardinal ideas of the prominent workers of this company, not only to provide such a home, but to so arrange it that the parents shall always have a chamber, and that the sexes shall be entirely apart among children. Moreover, the buildings are so planned that every room or bed-chamber may be exposed to the open air, and shall not open into long corridors flanked by water closets at either extremity, as in the Peabody and Coutts Buildings. All of these arrangements of the "Waterlow" Buildings are infinitely superior, in a sanitary point of view, to arrangements for the same purpose found in the other two. Previous to the rising of this company, some unsuccessful experiments had been made to unite these two apparently hostile elements, capital and philanthropy.

During my night walk with the police inspector, and in one of the most filthy streets I passed through, I saw a dirty-looking, two-storied brick building, planned differently from all adjacent to it, and somewhat in the form of the model lodging houses of the present day. The windows and steps were unswept, some of the glasses were broken, and it bore all the marks of being inhabited by a rude, careless set. No flowers bloomed from its window sills; the steps leading to it were rickety, and the fence near it had that zigzag appearance so significant of a drunkard's home. There was an entire want of thrift about the whole premises. "There," said my guide, "is a model lodging house, built from a most benevolent desire to raise the miserable, and at the same time to get some return for capital,—you see how it looks now,—the poor man who built it failed in his

undertaking." To my inquiries, our guide gave the following further history: "It was originally built rather extravagantly by one full of benevolence, but of little practical experience. It stood in the very midst of an abandoned community. Hence, no one that was respectable would occupy it. The owner had not the ability or wish to collect his own rents;* consequently, great arrearages were allowed to accumulate. Finally, in despair, he leased it to another, with the idea of his sub-letting the tenements. The lessee was a man of no principle, and soon, to his horror, our philanthropist found that what he had erected for the improvement of the neighborhood was its curse,—it became the most elegant brothel of the street. Of course all this was stopped, but it was too late, the house never recovered from this blow to its reputation." Truly here was a monument suggestive of reflections of no very pleasant nature. These reflections, however, were amply replied to by the results accruing from the Industrial Dwelling Company's operations, and still more agreeably and forcibly met by the "Organized Work among the Poor," originated and so successfully carried on by Miss Octavia Hill of London.†

Again, previously to the rising of the Industrial Dwelling Company, another company had been formed. This was called the Metropolitan. It arose from the idea first brought out by that most excellent, as well as exalted person, the late Prince Consort, who proposed it at the First World's International Exhibition, viz., in his "Model Lodging House." The company arose very soon after this exhibition, and under that stimulus; but it failed to bring more than $1\frac{1}{2}$ to 2 per cent. It gradually drooped and settled up its affairs as a comparative, if not a real, failure. Although its operations were more successful than its predecessor's, it failed of getting what moneyed men deemed a good return for their capital employed. Of course capital shrunk from philanthropy, and philanthropy without these "sinews" became weak.

At length the two leading spirits of the Improved Industrial Company that has accomplished this complete union, met;—employer and employed, each a genius in his own department.

* Possibly, if this gentleman had had the tact and wisdom evinced by Miss Hill, he would have succeeded in his kind undertaking. See section entitled "Organized Work among the Poor."

† See Statement V.

The able financier, the wealthy humane man, one of broad, generous views, and of a good common sense, the head of a large printing establishment, alderman of the city of London, Sir Sydney Waterlow, agreed to advance money to the practical mason, Mr. Allen. This mason labored with his hands, but his heart was full of good will to the poor, among whom he was born and had lived nearly half a century. He saw them daily everywhere around him suffering for want of "good, *healthy* and *tasteful* homes." His head became full of plans for the erection of buildings for that desirable object. He knew all the dire wants of the case, for he had grown up under the same pressure. Hitherto the home of the workingman has been neglected; "consequently," remarked Mr. Allen, "he has resorted to the tap-room, where alone he has found brightness and mirth." Fortunately, Mr. Allen was brought into relations with the rich capitalist above alluded to, who had employed him as a mason, and with him he urged his plea. Sir Sydney Waterlow listened with attention and interest, and with three other friends agreed to advance the means upon the plan suggested by Mr. Allen, provided, on its examination by an accomplished architect, it should be found to be according to strict legal and architectural principles, so as to give safety to every room and individual in it. The result was favorable, and from that time to this, viz., from 1863, Sir Sydney with others, forming a limited company, have continued to build and to extend their operations, Mr. Allen remaining as their architect and chief superintendent.

This company was originated in the above named year, and made its first half yearly report in 1864. Sir Sydney has been its chairman and mainspring since its origin, and to the vigor, fine spirit and practical sense of these two men, with ample means at their disposal, it doubtless owes its perfect success. The following extracts from the remarks of Mr. Goshen, Member of Parliament, at the 7th half yearly meeting held at the Mansion House, February 14, 1867, may be quoted. He said that he felt "that the Company was not only one of great private interest, but also of great public importance;" and that "the greater the extent to which the principle could be carried, the better we should be able to solve the great problem as to how our laboring classes are to be accommodated." "It has

been asserted that when a low class of houses are pulled down, and new buildings replete with all the improved sanitary arrangements are erected in their stead, it can only be done at a loss. I consider that it is the object of this company to disprove that assertion, and to show that good buildings can be erected in the place of bad ones at a profit instead of at a loss." "A profitable business can be done if sites are judiciously selected." Some of the speakers alluded, as capitalists, to their gratification at the fact of the good return for the money invested. One regretted that the houses were not for the very poor laborer, but rather for the common mechanic. To which reply was made that, if the artisan leaves his present home the laborer will move into it, and thus both be improved in condition.

The directors in their report say, "during the previous four half years dividends of five per cent. had been paid, and a sum equal to 25 per cent. of the net profit was carried to a reserve fund." The directors believe that, from their previous experience, there was a fair prospect of an annual profit of at least six per cent., after making liberal allowance for contingent expenses.

The following appears in the Fourteenth Half-Yearly Report made at a meeting held at the Mansion House, June 12, 1870.

The whole of the share capital, viz., £125,000, has been subscribed, and a further sum will be borrowed at 4 per cent. from the Public Work Loan Commissioners, which will represent a total capital of £250,000. The company had generally houses well occupied, except at Greenwich where, owing to the depression of trade in that locality, they suffered as the Peabody Buildings at Shadwell had, viz., from a loss of tenants.

The estates of the company, with number of tenements in each, are as follows:—

	TENEMENTS.				
	3 Rooms.	2 Rooms.	1 Room.	Shop.	Total.
Cobden Buildings, King's Cross Road,	8	10	-	2	20
Nelson Buildings, Bridge Street, Greenwich,	20	20	-	-	40
Tower Buildings, Brew House Lane, High Street, Wapping,	30	30	-	-	60
Stanley Buildings, Old Saint Pancras Road, King's Cross,	51	50	-	3	104
Palmerston Buildings, City Garden Row, City Road,	36	36	-	-	72
Cromwell Buildings, Red Cross St., Southwark,	10	12	-	2	24
Derby Buildings, Britannia St. and Wicklow St., King's Cross Road,	40	118	-	10	168
Gladstone Buildings, Willow St., Finsbury,	84	84	-	-	168
Waterlow Buildings, Bethnal Green Estate,	21	48	3	-	72
Total completed,	300	408	3	17	728
Buildings in course of erection at Ebury Street,	50	60	-	10	120
Buildings in course of erection at Ebury Square,	40	25	-	4	69
Buildings in course of erection at Bethnal Green,	40	130	-	-	170
Total either erected or being erected,	430	623	3	31	1,087

With exception of 72 tenements in the Derby Buildings, where one scullery and copper, &c., are provided for every three dwellings, each tenement has a separate wash room, copper for heating water, water supply and other conveniences, the cost of which is about equal to that of a room.

The methods pursued in raising the funded capital is as follows. I quote from the prospectus issued in the year 1867 : —

“Capital £250,000, of which £65,000 were then subscribed. Shares £25 each, £5 to be paid on allotment and the remainder in calls of not more than £5 per share, at intervals of not less than three months.

“A bill has been recently passed which will enable the company to largely increase the extent of its operations, by borrowing of the

government at 4 per cent. interest, a sum equal to the outlay on its buildings. A profit of £5 1s. per cent. interest (being nearly one per cent. less than the estimated annual profit) will be sufficient to repay both *principal and interest* of the loan at 4 per cent., from which it will follow: (1st.) That the saving of nearly one per cent. on the borrowed portion will increase the profit on the shareholders' part of the capital to seven per cent.; and (2d), that at the expiration of forty years (during which the loan is current), the unencumbered reversion to the buildings created by the investment of the borrowed money, will double the value of the company's estate. This anticipation, too, is irrespective of the ordinary progressive increase in the value of landed property. Houses in some districts of London double in value in the course of a few years.

"The evils of great towns spring almost entirely from overcrowded and ill-constructed dwellings, and no permanent benefit can be conferred on the working classes until this, the primary evil, is removed."

Of the buildings mentioned above, I visited the Cobden, Derby, Stanley, Cromwell, Gladstone and Tower. I also examined a new block erecting at the expense of Mr. Allen, and called by his name. They all have the same general appearance, excepting that the Derby has a less imposing aspect than the rest. The others present a very neat appearance, not to use a higher epithet, built as they are of brick and manufactured stone, with stone finishings and steps, and iron balustrades on each. Everything I saw looked very clean, and the superintendents assured me that the same general results as to health and morals followed in their train, as noticed in the Peabody and Coutts Buildings. Tenants dislike to leave, and if trade for a time compels them to leave, they gladly return. The sole objection is that above alluded to, viz.: that the rents necessarily are a little higher than most of the *very* poorest can pay, averaging about twice as much as is asked in the Peabody Buildings, while giving many more conveniences and an *entire home to each family*. The following table shows the rents per week for some of the buildings and gives an idea of the whole:—

BUILDINGS.	Four Rooms, Kitchen, &c.	Three Rooms, Kitchen, &c.	Two Rooms, Kitchen, &c.	One Room, Kitchen, &c.
Derby, .	-	7s. 6d. ; at top, 5s. 9d.	7s. 3d. ; at top, 5s. 5d.	-
Cobden, .	-	7s. ; 4th story, 6s. 6d.	5s. 6d. ; 4th story, 5s.	-
Stanley, .	-	7s. ; at top, 5s. 6d.	6s. 6d., at top, 5s.*	-
Allen, .	9s.	-	5s. 6d. ; 6s. 6d.	4s.

* With two bed closets.

In the building now erecting at Bethnal Green, one room only is provided. We cannot but hope that this also will prove a success, even at a lower rate. Nevertheless, considering the very perfect houses, thus provided with two, three more rooms and all their addenda, and this within very short distances from the workman's place of labor, we cannot consider the rents high.

Of course it was important to see and converse with the men most interested in this great, this growing and most successful company, whether we consider it in the light of the investment of capital or as a matter of sanitary reform, destined to exert an immense influence on the future health of the English people. These interviews I sought. They only convinced me more than ever of the philanthropic views and the wisdom and far-reaching sagacity of Sir Sydney Waterlow and of his assistant, Mr. Allen. "I build for the future," said the latter to me on one occasion. "I have lived and toiled among the working men of London over forty years, and I know their necessities and their desires. They have been all that we want steadily but slowly improving. I feel sure that sometime after I am dead, every mechanic will live in such buildings as are now erecting. Each one will have his own neat, tasteless home." Mr. Allen believes in cultivating the æsthetic part of the nature of man. A well-trained flower on the window-sill reveals to him humanity somewhat more developed and a better tenant to be chosen for his newly-built houses, than when he finds neglect in this particular. Yet this man is a workman

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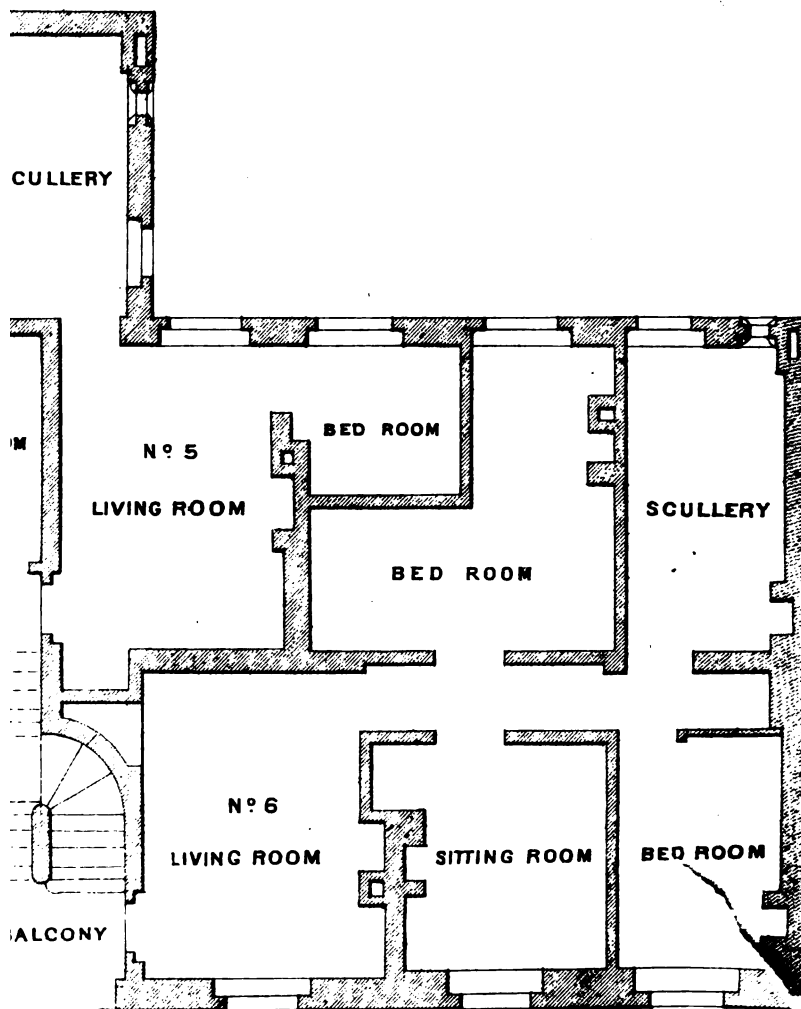
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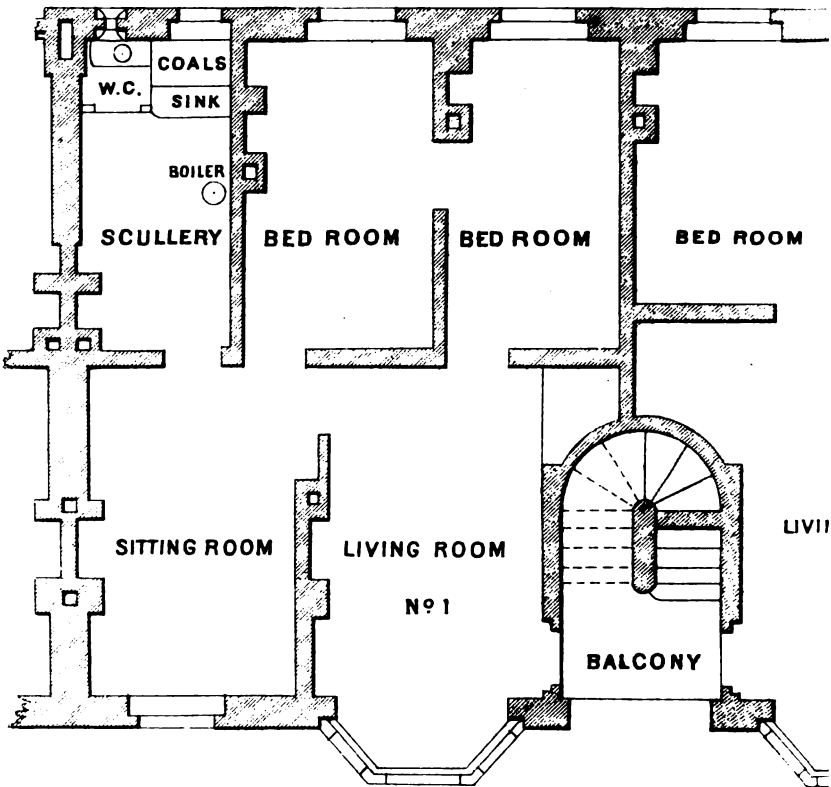
IBURY, LONDON.

by Mr. Allen & finished Sept. 1870.



IMPROVED HOM

This sketch represents on a



					s.	d.
<i>No. 1 Contains four rooms &c. Weekly rent</i>					9	0
.. 2	"	two	"	"	do.	6 0
.. 3	"	three	"	"	do.	7 3
.. 4	"	three	"	"	do.	6 3
.. 5	"	two	"	"	do.	5 6
.. 6	"	four	"	"	do.	9 0

and uses his trowel if need be and dresses as a workman should when at his daily labor. Sir Sydney is the complement of him, a philanthropic financier, with ample means and full of enthusiasm for the ideas underlying their great mutual undertaking. Sir Sydney considers the company as equally a fine success as a sanitary measure and as an investment for capital. Everything is conducted on the most rigid economy; no salaries are given. Mr. Allen, who has already amassed a sufficient sum to enable him to build a block of buildings on his own account, assures me that the company never makes less than twelve per cent. He expects to make that with his own at the prices above named, and all the rooms are engaged before the house is finished.

On the plan herewith given, are seen the arrangements of six tenements or one-half of one story of "Allen's Building" near Finsbury Square. It is the latest tenement erected by Mr. Allen, and was opened in September, 1870. The building is of brick, with stone finishing. It is five stories high. The rooms are eight and a half feet high from floor to ceiling. The front is about one hundred feet on the street. Its depth is a little over forty feet. The central part of the front line is set back a short distance, and has four bay windows on each story. The two end portions present, therefore, the appearance of wings added on each side of a more elaborately constructed centre. The structure has a certain degree of elegance and refinement about its exterior, which would make it not inappropriate for any of the fashionable streets of the metropolis. Yet it is filled wholly with a series of small tenements, very convenient and perfectly lighted and ventilated, the homes of some of the humblest of the people of London. These homes are constantly occupied. The site of the building is directly opposite a wretched, low tenement house analogous to the "Crystal Palace" in Lincoln Street, Boston. Mr. Allen feels sure, from his previous experience of the influence of the Waterlow Buildings, that the silent example of his house will tend to elevate the character of its opposite neighbor.

Sir Sydney and Mr. Allen were both very earnest about their system of ventilation, which gives free access of the air to every room, and allows, when two or three doors are opened, a free circulation of air through the whole house. They both

disapproved of the long corridors, and a community of water-closets flanking them, as in the Peabody, Coutts and other buildings. Mr. Allen spoke very decidedly on this point, and said that he thought fifty years hence all buildings constructed with such corridors would be among the past, and either wholly re-organized or occupied by a degraded set of tenants. Whether such prophecies will prove true remains to be seen. Meanwhile, there is no doubt on which side the sanitarian observer would stand on this question, for unless great and persistent care be daily taken, evil will sometimes result in the corridor water-closet system.

IV.

JARROW BUILDING COMPANY.

From the preceding statements it will be seen that a great step forward has been successfully taken in London. It has been proved that capitalists can safely pull down poor houses which are unfit for human dwellings and which tend to propagate ill health, crime and vice, and instead of these pests can build up healthful and tasteful homes for the people, and while thus doing they can gain money for themselves, and by the same act raise the human race to a higher grade of physical and moral health. This idea is springing up in various other parts of England. Everywhere men and women are thinking upon the subject. I happened to be at Newcastle-on-Tyne, and found there some buildings just erected in that city. At Jarrow-on-the-Tyne I visited some of the small tenements built under the direction, and at the expense of the Jarrow Building Company. These arose at first from a desire on the part of a large iron ship building company to provide proper tenements for its own workmen. The company has been in existence since 1863, and very successful too have been its operations. These operations consist in putting up separate small buildings on land large enough to give a small yard to each. The build-

ings are two stories high, have two and sometimes three rooms, with washhouse, &c., to each. They form long streets, which are broad and well paved, and have neat sidewalks on both sides.

On taking possession of any premises with the intention of eventually purchasing it, the tenant signs the following agreement with the trustees of the company, viz.: to pay annually ten per cent. of the price named; viz.: five per cent. for the rent and five per cent. towards the price of the estate; such payments to be made in fortnightly instalments; that if he fail to make such fortnightly instalment he shall be fined 3*d.*, if a second time 6*d.*, a third time 9*d.*, and so on; that if at any time such fines amount to the sum already paid by the tenant, the trustees are to have the right to enter and hold the premises, as if nothing had been paid, and to eject the tenant; that possession shall be given after signing of the agreement, but that a full deed shall not be demanded until three months after the final payment, when the trustees agree to give such deed, the tenant paying the necessary expenses; that the tenant must keep the premises in good order and shall not sell them without permission from the trustees.

The above summary gives an idea of the nature of the transactions between the trustees and tenants at Jarrow. I examined the houses and found them neat and simple homes, and learned that the affair had been quite successful, and that, one after the other, each workman was becoming a proprietor of his own place of residence. The stimulus thus given to every individual mind among the workmen has been very beneficial. It had also proved an excellent sanitary measure.

V.

ORGANIZED WORK AMONG THE POOR.

In all that precedes we have found it needful to have either vast police authority, great private benevolence, or finally a combination of philanthropic effort with capital, in order to raise to a proper healthful standing the homes of the poor and of the laboring population.

We now come to consider perhaps the most interesting, as certainly it is the most extraordinary experiment of all yet instituted, viz.: what Miss Octavia Hill, the originator of it calls "organized work among the poor." It shows what a single individual can do if one only will act with patience, perfect self-control and wisdom and, if need be, self-sacrifice in a good cause. By these qualities, and with very little money, Miss Hill has succeeded in conquering difficulties seemingly, at first sight, insuperable. She has herself explained her methods in the "Fortnightly Review" for Nov., 1866, and in "McMillan's Magazine" for July, 1869, and more recently in a private way, at the request of Mr. Wilkinson, she drew up a statement which she has kindly had copied for my use, and the greater part of which I will here present. It tersely tells the story of what *has been* done. Later in this paper I will describe her usual method in more detail:—

MISS HILL'S STATEMENT, JULY, 1870.*

"The main principle on which the following experiment was founded, is that personal influence is the lever by which the poor can be raised; that this is exercised better by those who stand in some recognized relation to them, such as that of landlord.

* A short time before I left London in November, Miss H. informed me that she had given the paper for publication elsewhere.

“The first property, three houses of six rooms each, was bought in 1864 for £828. It was leasehold with an unexpired term of fifty-six years. It has paid five per cent. from the day of purchase on the capital invested. It has repaid a portion of the capital: a further sum of £40 has accumulated from the profits, which sum, Mr. Ruskin, the proprietor, wishes to devote to benevolent purposes. It has also paid for building a room for social gatherings. These sums have been realized after providing for the repair and continuous improvements of the property. The second purchase was a freehold consisting of land, on which stood five houses of four rooms each, and one of fourteen rooms, and some old cowsheds. It was bought in 1866, and cost £2,725. The cowsheds were demolished, and the space used as a playground for the neighborhood. An additional floor has been added to the houses, making forty-five rooms in all. This property has realized five per cent. also, and considerable sums for repairs and improvements.

“Encouraged by the result of the experiment, Mrs. Stopford Brooke last autumn bought the leasehold of five houses in Barnett's Court. Each house contains ten rooms; these also have paid five per cent., and already begin to pay the capital. Lady Ducie last Christmas bought the leasehold of six houses in the same Court. They also promise to pay well.

“Another lady has purchased a plot of freehold ground in the poorest district in Marylebone. A sum of £2,000 for building on it has been contributed by four ladies, and the plans are in preparation.

“In all these instances a marked change has taken place in the manners, habits and morals of the tenants, who in most cases are the same as were in the houses at the time of purchase. The rents have been rigidly exacted, and perhaps the sense of fulfilment of a duty has much contributed to raise the spirit and tone of the people.

“In keeping such houses in repair a great deal of carpentering, plastering, white-washing, and other rough work has to be done. In times of scarcity of work this forms a valuable means of giving employment, thereby assisting, without demoralizing the poor. Great care should be directed to supervising the cleanliness of the houses. Health more often depends on the way the house is kept than in its construction and appliances. The reckless destructiveness of this class of people has been greatly cured by setting aside a fixed sum for repairs and improvements, of which an account is rendered quarterly to each tenant, and if there is a surplus the tenants in turn decide how it shall be spent in improvements.

"In times of want no charity has been given, but work has when possible been found. The amusements of the tenants have been provided for as far as possible. Excursions in the country; social meetings in winter, concerts, &c., have been arranged, and have brought into more friendly contact the tenants, and those interested in them."

It is evident, from the above account, that the plan succeeded because Miss Hill, an intelligent, well-educated lady, fully appreciated not only the difficult and delicate relations of landlord and tenant under such circumstances, but knew moreover the influence she could exert for good over rougher and less cultivated natures.

I sought an introduction to Miss Hill, and I had long conversations with her. I had previously visited one of her houses. Her lady-like self-possession, and accurate and prompt ways command the respect of every one who comes in contact with her. One feels that there is no sentimental nonsense about her, but a downright honest and clear way of looking at unpleasant circumstances, and an unswerving determination to carry out what she deems a simple duty. This duty would be to most people very irksome, nay, in many respects absolutely repulsive. Few would undertake it, because of this essentially disagreeable nature. What she has undertaken and has accomplished, most people would say was entirely "out of woman's sphere." I cannot present her plan to the Americans in any better way than by the following hypothesis:—

Suppose any lady in New York or Boston should say: I will buy the worst den at Five Points or in North Street, even if inhabited by cut-throats and garroters. I will become their landlady. I will call personally every week for my rent, and rigidly require it; I will give no charity, but will if possible provide work; I will enlist their sympathies by being myself interested in their welfare. If they are ill I will try to comfort them; if they are uncleanly, I will try indirectly to make them cleaner. I will occasionally induce the parents to bring the children out into the Central Park, or into the Public Garden, in order that they may feel the beauty of flowers, and may taste the sweet freshness of the pure air. I will try to open their eyes to all the fair things of art. Miss Hill has not only

proposed, but has actually done all this.* She has taken charge of houses in most wretched and low neighborhoods, in one of which the previous landlord had been a drunkard, and his tenants had copied his example. The filth of this place was extreme. The yard and wash-house were choked up with the nasty accumulation of years, so that it was impossible to use either, and therefore they had been definitely closed for some time. Very many of the windows of the various rooms were broken and filled up with old clothing. No paint had touched the house for a great while. The tenants were a wild, swearing, destroying race. Miss Hill gave notice to them of the change of landlords; told them she should simply clean up the house and repair some of the broken parts; that she wanted them to aid her by treating the premises properly; that she should ask for the rent previously demanded; that it must be promptly paid weekly, and that neglect of that bounden duty for two weeks would produce a legal summons to quit the premises.

At first no good result seemed to arise, as the next time she went she found even the new places injured, and at times wantonly broken. She said that she hoped such a result would not happen again, and that she had made up her mind to spend upon the house a certain sum annually for repairs or improvements, if actual repairs were not needed; that she should charge each tenant with whatever injury was found in his or her room. Of course, therefore, they would see that the better care they took the more would be left for the general improvement of the premises. Upon the precise method of expenditure to be made with the saved funds, she should consult the tenants each in turn, and perhaps follow his or her counsel. The result was all that could be desired. The manners of all improved. Instead of vieing with one another how things could be injured the emulation was to save as much as possible. Each tenant has tried to improve his own premises. The savings thus accruing have enabled the landlady to add a new story to the house, and to introduce an ample water supply. A playground for the children, and pleasant shady space for elders has been opened in front of the building. Trees are growing where formerly were dirty sheds, and green vines climb over walls formerly be-

* Since writing this I have heard of one similar undertaking by a young lady in Boston.

smeared with filth. The men have more self-respect, the women are more cleanly, the children are better clothed, and go more regularly to school.

Similar results have taken place in another dilapidated, doorless house, "a perfect rat-hole."

The previous landlord had been garroted and nearly killed on demanding his rent. Mr. Ruskin, though aiding with pecuniary means, deemed it almost hopeless even to attempt to do anything with such a place. But Miss H. succeeded. I asked to be allowed to go around with Miss Hill when she collected her rents, and she permitted me to do so. Into every tenement she went she quietly asked for her dues, but had some word to say about the family. The smiling and bright answers she got from almost all showed how different the relations must be between her and her tenants, than those which had existed between them and her predecessor. In one dark and dirty alley, however, I anticipated evil and rough treatment, for the agent informed Miss Hill that one of the tenants had sworn he would not submit to a summons that had been served upon him, to quit for non-payment of rent. We went our rounds, however, as if no remark had been made. We found the house in rather a poor condition. As it had been only recently taken in charge, there was some want of neatness about the stairs, &c. Miss Hill remarked upon it and added, "*we have to educate ourselves to wait in hope.* We cannot make them suddenly clean. For three weeks I have been trying to induce them to properly wash that window. It is, as you see, still dirty. They will, however, learn by and by."

At length we arrived at the upper part of the house, and entered a very low room, evidently inhabited by drunkards. Everything was disorderly and comfortless. A sulky, rough man, and a bloated-looking woman, his wife, were there.

Miss H. merely said, "Mr. ———, I learn that you decline receiving the summons. You will understand that it has been legally served, and if the rent be not paid next week, you *must* leave." He answered very doggedly, and *pounded furiously* upon the shoe he was mending, possibly to overcome the inclination he had to lay violent hands on his landlady. He was well enough able to work if he chose to do so, and could also pay his rent if he would not drink. This man was the

ruffian about whom we had been warned. A low muttering from husband and wife was the only reply, as we turned to leave the room.*

The whole visit was a very valuable one. It showed that the qualities named in the earlier part of these remarks were all that were needed. The last house I have no doubt will be redeemed and the tenants raised morally, as in the others alluded to, and disease, too, will strike them less generally under the mental, moral and physical cleansings that have been inaugurated.

I may mention as a proper finale to this whole story, that Miss Hill, when speaking of the gradual education of her tenants, remarked "that some of the lowest had so far risen in self-respect, and their means of support having consequently perhaps increased, they wished to *get into higher and better rooms, out of their old pathways!*" She had encouraged them to do so. In fact, she is now beginning to arrange a better class of houses, just above the level of these lowest dens, and hopes that she shall win many up to them, even if they have more rent to pay out of their small earnings in order to gain that end.

SUMMARY OF THE WHOLE INVESTIGATIONS UPON SOME OF THE
MEANS NOW IN OPERATION IN ENGLAND FOR IMPROVING THE
HOMES OF THE PEOPLE, AND THE RESULTS OF THESE OPER-
ATIONS ON THE HEALTH AND MORALITY OF THE OCCUPANTS.

I have thus given five separate statements alluded to in the first portion of this letter. Although each can be read by itself, an important idea underlies and runs through the whole, viz.: that by improving the homes of the people; by making them neat and wholesome instead of filthy and stinking, we raise men, women and children to a higher standard of physical and moral health. The *first* paper entitled a "Night Stroll, &c.," proves that *English law* jealously guards the *public lodging houses* of the poor and vicious. It prescribes rigid rules in regard to cleanliness, amount of air, water, &c., for each lodger. At the same time the same law allows the *private*

*About three months after this interview, I asked Miss Hill what became of her rough tenant. "Oh," replied she, "he did very well. He forthwith paid his rent, and I have had no further trouble from him."

houses of the miserable and degraded of the same class to become by their filth, moral and physical pests of the neighborhood in vast districts in London. As an addendum to this paper, I have given another by which Boston seems to vie with London in its low tenements, and in disregard for sanitary law it is perhaps superior to the English metropolis.

Second. I have briefly described the Peabody and Burdett Coutts Buildings. I have given them as illustrations of philanthropy, and of its effects upon the dwellings of the laborers, and their results upon the health and morals of the people.

Third. I have shown in my notice of the operations of the "Improved Industrial Dwelling Company," how philanthropy and capital can join hands and each reap an ample return for its efforts made and for means given.

Fourth. I have indicated the workings of the Jarrow Building Company, in which the tenant, besides gaining all the advantages afforded by the preceding methods, is stimulated to become himself the proprietor of his own home.

Fifth. I have described the extraordinary and yet simple labors of Miss Hill, aided by the well known writer on art, Mr. Ruskin, Rev. Stopford Brooke, &c. By these labors the vilest dens of London have been reformed to neatness and morality, by the personal influence of the individuals engaged in the matter, while at the same time the relations of landlord and tenant have been rigidly enforced, all money-giving charity has been virtually abolished, and with all this there has been an ample return for capital invested.

VI.

COMPARISON OF THE COMPARATIVE VALUES OF A MODEL LODGING HOUSE AND COMMON TENEMENT BUILDING IN BOSTON.

In the last year's report of your Board, you regretted that it was impossible to finish the account of the "Comparison of model lodging houses and common tenement houses, in their

relative effects upon the health and morals of the people." Though signed by the whole Board, the final statement really devolved upon myself, who had commenced the investigation.

Circumstances beyond my control compelled me very soon afterward to leave America, and I have been unable to make out a final report till within the past week, which renders it less complete than I could wish. I should regret this very much if I had not been able during my enforced absence to make the preceding investigations, which I deem, and I hope the Board will consider, not only not irrelevant, but rather, as it were, adding to the foundation of the practical results of our last year's investigations in Boston. To these results I propose now to draw your attention.

A thorough examination was made by Dr. A. L. Haskins, under the direction of the Board, and according to a certain definite plan of questions, at each particular tenement in two houses, viz. : the model lodging houses in Osborn Place, and the so-called "Crystal Palace," a common tenement building in Lincoln Street. Replies believed to be accurate, or nearly so, were obtained from these two. Subsequently, buildings in Stone's Yard, in Cross and Stillman Streets, Institute Avenue, Endicott Street, and Friend Street Court were seen. All of these are of the lowest and most degraded class of buildings. From all these last the returns were rather imperfect. In one, the proprietor compelled the tenants to eject our agent.

MODEL LODGING HOUSE IN OSBORN PLACE, BOSTON.

The results obtained may be summarily stated as follows :

The model lodging house consisting really of three brick buildings, provides a residence for poor families. They contain all the appliances for comfort and health provided by modern society, at a cheap rate, and yet large enough to be amply remunerative to the proprietors.

It is situated on the original soil on a somewhat elevated part of the city, where the tides never reach. It is five stories high, built of brick ; is of a very neat appearance. It has an ample supply of fresh air around it. It has a large common entry, and private entries for each family home. Each family has 3 or 4 rooms with windows in each. There are 182 persons in the building, 65 of whom are children. The basements are

used for storage, not for dwellings. The buildings are generally clean and sweet smelling, save when, by carelessness, offal is allowed to remain longer in the dust-bin than is proper. The families ventilate their rooms by frequent opening of the windows. Sunlight enters every room. An average of 931 cubic feet of air is provided for each occupant. Each family has its own water-closet, which is kept scrupulously clean. There are no "privies" on the place. Cleanliness and absence of unpleasant odors are manifest everywhere. The drainage is excellent. Each family has its own bath-room in one building. Two common bath-rooms are found in the basements of the two other buildings. Thrift, neatness, quiet, and orderly deportment prevail throughout. All the tenants praise the building; dislike to leave it except when necessity compels a change of residence. The result to the proprietors is a six per cent. investment and the payment of all expenses.

The birth-places of the tenants are as follows :—

United States,	.	.	.	.	.	.	42
Ireland,	.	.	.	.	.	.	1
Nova Scotia,	.	.	.	.	.	.	1
Newfoundland,	.	.	.	.	.	.	1
France,	.	.	.	.	.	.	1
Germany,	.	.	.	.	.	.	1
England,	.	.	.	.	.	.	2
							<hr/> 49

The health report is as follows :—

It was good before entrance,	.	48.98	per cent.
Improved since	"	24.44	"
Ill before and since	"	14.29	"
Ill since,	.	14.28	"

The death-rate is much less than the average death-rate of the city.

COMMON TENEMENT HOUSE, OR CRYSTAL PALACE, SO CALLED.

In striking contrast with this report let us now look at the aspect of the "Crystal Palace" in Lincoln Street. It is a large, filthy-looking building, with brick ends, but chiefly of wood.

Long open piazzas run in front and back of it at each story, upon which immediately open each sitting or living room. The ventilation depends upon the doors opening on these piazzas, and upon a small window adjacent, opening on the same. The bed-room, back of the sitting room, gets its only light and air from these two apertures.

Like the model lodging house, it returns a good percentage, but the rents are oppressively great. There are no modern appliances. The tides come up very near to the basement floor, but being built on made land no cellar exists. It is five stories in height. The air circulates freely around it, and the sun can reach some of the sitting rooms. It never penetrates any bed-rooms. There are sixty-two families. Each has only a sitting room and the dark bed-room above described. There are 295 persons in the building, 149 of whom are children. The basements are below the level of the street, and each family in them has four rooms, the bed-rooms being opened, and thus a passage is given through from the front to the back of the building. They are all damp, dark and dirty. Sunlight enters a little at the front door and window. Of cubic feet of air in the house we find only about one-third of what is found in the model lodging house for each tenant. No water-closets, but only a filthy privy in the yard is furnished the inmates. This privy was in a shockingly dirty state when our agent called; it was choked up. Odor from that and an obstructed urinal was very bad, even in November. No bath-room is found on the premises. Drunkenness and theft are not uncommon. None of the tenants praise the residence, though compelled to stay, owing to the cheap rents. Some were indifferent, and some even said they liked the place. The result to the proprietor is that he sub-lets to another who keeps a shop, and contrives to reap an ample reward, the exact amount being unknown. In other words, the house though so miserable in all its appointments, gives good returns of money to two persons from rent obtained.

The birth-places of the tenants by families are as follows :—

United States,	.	.	.	.	.	.	1
Ireland, .	.	.	.	.	.	.	60
Nova Scotia, .	.	.	.	.	.	.	1—62

The health report is as follows :—

Good before entrance,	67.74
Improved since entrance,	3.22
Ill before and since entrance,	9.67
Ill since entrance,	19.35

The death-rate presents some peculiar, not to say extraordinary results. Suffice it to say it was not so great as one would anticipate, save in the basements, where one-half of all the deaths occurred, and the death-rate there was higher than in the city at large. I forbear to give the few statistics obtained because further investigation on the point will be necessary.

REMARKS ON THE ABOVE STATEMENTS.

I might well leave these vivid contrasts between the two buildings to speak for themselves. Health, physical and moral, are the results of the model lodging house. Less physical disease and less mortality are noticed in some parts of the tenement house, than one would anticipate ; but intemperance and degradation of character are rife in them. From the former come neat, industrious, quiet, hard-working, temperate citizens and their wives and children. From the latter steal out some of our thieves, or stagger forth the reeling drunkards. Neatness of body and of dwelling is seen in Osborn Place. Beastliness of filth and noisome smells salute the senses in Lincoln Street. Sunlight, so bountifully shed upon every human being, is admitted to every room in the model lodging house. It is excluded, or but grudgingly admitted, in more than one-third of all the rooms of the low tenement, while into the bed-room, where the tender bodies of children spend more than half of their young lives, not a single ray can, by any possibility, enter. Ventilation is everywhere amply provided for in a manner appropriate to our climate, in the large entries, the windows in every room, and the ventilating shafts of the model lodging house. It is partially obtained in the tenement house only by opening the door or window in the living room, even in the depth of winter. This last fact, however, though, at first sight, it may seem a cruel exposure of a family, especially during the depth of our winter, is perhaps, a real blessing in disguise.

For the inmates, though¹ exposed to bleak and sometimes to biting cold wind, gain by this frequent opening to the street of their single door a freer circulation of air, comparatively pure, than is given to some of those who live luxuriously in the stifling furnace-heated houses of fashionable quarters of the city.

Such are the general characteristics of the houses and of their occupants broadly considered. But it will be well to examine them a little more in detail, and in conclusion suggest certain obvious remedial measures that may be necessary, or at least allowable, in connection with the tenement buildings generally in the cities of Massachusetts. In this examination I will refer to various items given above.

No. 1. *Site of the house.*—There is no doubt that the site of the model lodging house upon the somewhat elevated native soil of the city is really better for the health of persons living there, than are many parts of the newly-made land composed of mud and filth of every kind, but on which some of the richest houses of our city now stand. Investigations in this country and in England have fully proved the fact that actual disease is more liable to occur in a house standing on a damp than on a dry soil. In choosing, therefore, hereafter, a site for a tenement house, we should not neglect this consideration, even if the effects of it be not strongly manifested in the present returns.

No. 8. The evil of using a basement for a residence is distinctly seen in these returns. The model lodging houses have well-lighted, dry, airy basements, legitimately used for storage. The low tenement house uses the basement for residences. It virtually slaughters human beings by so doing, the rate of mortality being very many times greater in the basement than in the rooms above it, and greater than that of the city at large. In the basement fever, diarrhœa, scrofula and consumption are liable to prevail, and if an epidemic occur, the dwellers in such a place are peculiarly exposed to its influence. The State should forbid any owner of a house to rent a basement. Proper inspectors should have authority to shut up such places as being dangerous to the public welfare. In fact, I think the law as it now stands, if enforced, could apply a remedy.

The comparative healthfulness of the two tenements is not so evident as one would have thought it would have been. But the advantages of the model lodging, and the disadvantages of its opponent can be clearly seen on a closer inspection. The returns from the model house may be deemed more accurate than those from the low tenement house, because, first, the character of the residents is higher, and second, there is always more willingness to tell of good qualities, than of the bad qualities of one's homestead. Making these deductions we can say: *First*, a smaller proportion of these entering the model lodging house were said to be perfectly healthy; but notwithstanding this, nearly one-fourth of all of them gained in health during their residence, whereas only a very small proportion in the tenement house said that they had gained in health. Of these latter, we may infer that the tenement house, poor as it was, was really superior in its hygienic influences to their previous residence. For, of these families, one had lost eight children by croup, lung fever and convulsions, and another five children within six years previous to their entrance into the tenement house.

Second. Five per cent. more fell ill at the low tenement house than at the model house.

Third. A severer form of acute and of chronic disease is found in the tenement house than in the model lodging house, as the following statement indicates:—

Diseases Reported.

In Model Lodging House.	In both.	In Low Tenement.
Effects of pregnancy.	Catarrh.	Rheumatism.
Congenital diseases.	Bronchial trouble.	Typhoid Fever.
Debility.	Whooping Cough.	Conjunctivitis.
	Rheumatism.	Bright's Disease.
	Lung Disease.	Children in poor health.
	Diarrhœa.	
	Scarlet Fever.	
	Measles.	

It may be remarked, moreover, that from the results obtained from Boston during the cholera, and other epidemics, and also from London and other large cities, the filthy state of the low tenement house, is just the condition upon which these, sometimes rapidly fatal, diseases seize with awful violence. Such places thus become real food for contagious influences, nuisances to all in the vicinity.

In comparing the number of deaths in the two residences results different from what were anticipated, have been arrived at. The question will arise whether there may not be some error in the returns. The only answer that we can make is that Dr. Haskins recorded carefully, and believed he got the truth. Even during the investigation he was surprised not to find greater discrepancies in the mortality, as reported by the occupants of the two houses, apparently so different. Nevertheless, there is a difference, and the model lodging house holds its preëminence over its rival, and over the city at large. Probably the fact that air circulates freely about this particular low tenement house, the "Crystal Palace," and that other fact already referred to, viz., that every time the door of the living room is opened the inmates have access to this air from the street, may so improve this filthy place that people live there perhaps in spite of, what usually are deemed, very pernicious influences.

It would seem, however, that there may be some deleterious power or powers at work in the community at large, upon the rich as much as the poor, that must raise the death-rate for the city at large. I would suggest the following considerations as bearing materially upon the mortality of the city at large, and which have little or no influence on the occupants of this tenement house. The almost universal use of closely fastened double windows, and hot air or water or steam heated rooms; the various exposures in dress; the want of regular physical exercise in the open air; the turning of night into day; the merry-makings of the rich, and long labors of the poor in ill-ventilated shops by day, and the night-watches of artisans at work for their employers; the long weary hours of the seamstress, &c.; the over-excited mental condition of society at large,—these causes, from most of which the tenement lodger is free, tend to raise the death-rate of the city.

When we look, however, at the terrible mortality connected with a residence in the cellar, or basement of the tenement building, and find that notwithstanding the greater freedom in the circulation of air in the bed-rooms of the basement, than in the rooms above (the bed-rooms being opened into one another so that a stream of air *may* be made to pass through the four rooms in which the family live), the death-rate becomes higher than that of the city at large, and that one-half of all the deaths in the building occurred there, we recognize the deleterious effects of a residence in that low, damp, dark and dismal place. Certainly here, if ever, the law ought to step in between landlord and tenant and should declare what the proprietors of the model lodging house virtually admit, viz.: that the basement is unfit for human habitation.

The part of our Report which gives the relative moral and individual conditions of tenants of the two houses, appeals to every humane instinct of our nature. We report the thrift, neatness and temperance that mark the model house, and on the contrary the filth, dirt, crime, drunkenness, and what is worse the apparently stolid indifference to their degraded condition that mark several of the occupants of the tenement house. The Rev. Dr. Channing used to say that the statement, if true, that the slave was happy in his lot, was no valid argument in favor of slavery, but rather one of the strongest arguments against it, inasmuch as the fact of his remaining satisfied and happy in such a lot, proved that slavery had thoroughly degraded all manly instincts. Hence when we read in our returns from the tenement house, that thirteen out of sixty-two families *liked* their wretched and filthy residence, and that twenty-one out of the sixty-two were *indifferent* whether they should go or stay, we feel the degradation to which human nature can fall. And we then turn with pleasure to the fact that forty-eight out of forty-nine in the model lodging house were *delighted* with their humble, but clean and healthy homes. Twenty-eight, however, of the sixty-two in the tenement house disliked it, and the reason for that distaste was the amount of noise, of drunkenness, filth, and possible theft that surrounded them. In other words, more than one-third of the dwellers in this wretched place virtually appeal, though mildly, like the poor Franciscan, to us for help. Should not help be extended to

them by some one? Who among our rich men are ready to come forward, and either individually, or by large combination of capital, erect model lodging houses like those described in this paper, or like those recently erected in London by the regal munificence of our distinguished countryman, Mr. Peabody, or by Sir Sydney Waterlow and Mr. Allen?

The examination relative to receipts for capital expended presents items that are eminently satisfactory from both houses. The income cleared from both is all that could be wished, notwithstanding the totally different class of building which gains the rent.

Prepayment for short periods, a week or thereabout, is the invariable rule in both. Doubtless much depends on the vigilance and decision of character of the proprietors, and of their agent. But when pure philanthropy and a steady six per cent. interest on capital can be combined, even the most practical common-sense business men need no longer stand aloof from this great undertaking of building suitable houses for the poor. In Boston this appeal is the more urgent at the present time, owing to the large improvements that are now making at Fort Hill, whereby thousands of our poor are driven from their homes, in order that their sites may be turned into vast thoroughfares of business. In this appeal let us suggest the following to the advocates of temperance. What human being is there who if compelled to live in such filthy homes as that presented by the low tenement house, would not be degraded and almost inevitably tend to drunkenness? Is not drunkenness, if for no other reason than to drown for a moment the sense of surrounding wretchedness, a most natural result? The cause of temperance thus becomes intimately blended with that of building pleasant homes for the poor.

Intemperance claims our attention under the law, and it strikes at the root of all health. Take away a man's or woman's self-respect, and you tend to drive them to low habits of body, and thence come disease and death. They no longer revolt at a filthy, unhealthy home. Place the same persons in clean, well-appointed apartments, where they can live in comfort with their families, and can attend to the decencies and proprieties of life, and they are lifted up morally; their intellect usually follows with an almost equal pace towards a true manliness and

womanliness of character and behavior, and with these comes a greater health of body.

But long before private charity and enterprise shall have erected homes for the poor, cannot the city authorities or the State do something towards improving this and many more tenements, equally or perhaps more degraded than the subject of our investigations?

By ordinance, the aldermen of the city of Boston act as a board of health for the city. By law they can examine all nuisances and order their removal. They can punish a man who disobeys the mandates of the board or council. They may notify tenants living in a place that proves a nuisance, and order its abatement.

They may even forcibly enter into any place supposed to contain a nuisance, and all opposers of their authority can be punished.

There would seem therefore to be law enough, if it were only carried out effectually.

Why is it therefore that such nuisances are allowed to exist? Is it possible that men can consider such places as not nuisances in the eye of the law? Surely anything that can add fury to a pestilence ought to be called a nuisance. These vile tenements do this. A basement that brings death at a greater rate than in the city at large, ought to be summarily closed as a place of residence, as a nuisance of the grossest kind.

This excuse therefore cannot be offered. The old-time maxim "What is everybody's business is nobody's business," really is the reason for the neglect. How can we expect the mayor and aldermen of the city of Boston to attend to such things? From the nature of the case it would be impossible for these officials to be able, if willing, personally to manage such details. It remains, however, as their duty, and they are bound by some means to abate such evils.

VII.

CONVALESCENT HOMES.

These noblest of charities and promoters of the health of the people, have recently sprung up in many of the chief cities of England. They do, perhaps, quite as much service to the poor as the various hospitals of the kingdom. They are intended—

1st.—To provide in the country rest from labor, and proper food and lodging for those who, while usually living and working in the crowded cities, become not really ill, but are in that condition, that if care be not taken, they will either fall into a state requiring hospital treatment, or become seriously and perhaps permanently ill. ♦

2d.—To take care of that numerous class of patients who, having stayed a long time at the hospitals have recovered so far as to be discharged, and yet they are unable to attend to their daily work, and really need a few weeks of country air to thoroughly restore them to labor. Or

3d.—For perhaps an equally large class who, while having remained a long time at their own homes ill, are still unable to work, and do not seem to gain farther good from any remedy. Nothing has seemed to do them any good,—and their natures, as it were, unconsciously sigh for a breath of country life.*

For all of these classes of invalids the Convalescent Home is a boon of inestimable value. Almost every person in the larger cities of Massachusetts has seen such invalids, and has lamented, if he have thought at all upon the subject, that there was not such a sanitarium a short distance from his own town, to which he could direct the sufferer.

Only a few years ago (comparatively speaking) a gentleman in London met such a case in a young female who had been

* "What these persons want are not hospital comforts, however liberally bestowed, no medicines, however skilfully prescribed, but the natural restoratives of fresh country air, good food, gentle exercise out of doors, and that mental quiet and freedom from anxiety which cannot possibly be the lot of the laboring man, while struggling at once against poverty and bodily weakness."—*Report of the Metropolitan Convalescent Institution, 1854.*

discharged from one of the hospitals in that city, too weak to work, without money, and with hardly a spot on which to lay her head. She appealed to the philanthropist. He saw her wants, but had no means himself to send her even for a few weeks into the country. He appealed through the journals for means to attend to this particular case. That newspaper article was the nucleus around which similar thoughts in the community immediately crystallized. And from it has arisen the really fine practical result, which declares that *every community of any size, and each hospital in large metropolitan districts must have a convalescent home*, or be faithless to the duties of a high humanity, which requires of each individual and each State to promote as much as possible, and by every reasonable means the general health of all. I wish to bring to your notice three institutions that I visited, in order to personally examine their working.

First.—The oldest and most comprehensive is the Metropolitan Convalescent Institution. It was founded in 1840. It has three homes, viz., the Asylum at Walton-on-Thames, and two children branches. In these last are taken children from two to fourteen years of age; one for girls at Hendon, Middlesex; and another for boys at Witcham. It has a central office at 32 Sackville Street, Piccadilly, London. The asylum at Walton is a large new building erected in a dry and healthy, but somewhat uncultivated spot. It presents an imposing appearance,—with its broad front, and with grounds tastefully arranged with shrubs and flowers in that peculiar beauty of landscape gardening much seen in England at the present time. The interior has large and airy corridors opening into wards or saloons for sitting, eating, sleeping, &c. All these have abundance of sunlight and sun-heat during the day, and free ventilation during day and night. Nothing extravagant or expensive is observable, but everything is provided to promote that complete rest for the body and soul which the worn-out invalid needs. In 1856 (after sixteen years of existence) the directors report that 8,000 had been received from the opening of it. Last year they reported that the building contains 260 beds, and that the “total number received annually exceeds 3,000. Patients from the various hospitals and dispensaries, and from the crowded courts and alleys all over the metropolis, are con-

stantly being received into it, and they in general are able to return to their employment with their health fully restored in a little more than three weeks."

The Institution is under the patronage of the queen and nobility, and is supported by voluntary subscriptions of very many private persons. It has a board of management consisting of 27 persons, and four trustees. Honorary and attending boards of physicians and surgeons are connected with it.

"Annual subscribers of one guinea, and donors of ten guineas, have the privilege of recommending one patient yearly. Annual subscribers of two guineas, and donors of twenty guineas, two patients; and every donor of thirty guineas and upwards, and every annual subscriber of three guineas and upwards, becomes a governor of the institution, and has the privilege of attending and voting at the general meetings of the governors, and of recommending three patients annually.

"Every clergyman who either lends, or himself makes use of his pulpit for a sermon in aid of the charity, has the privilege, if the sum amount to twenty guineas, of recommending for admission one patient yearly for the term of ten years, and for every additional fifteen guineas so collected, one additional patient yearly for the same term, provided that the words 'sums collected' be held to mean the actual amount paid in to the Secretary of the Institution exclusive of expense of collection, and exclusive of donations and subscriptions, for which the donor may claim a separate privilege."

I have entered into these details because this institution was the first, and is perhaps the most complete in its organization, and I have wanted to present the subject in a practical and suggestive form to the citizens of Massachusetts.

The institution for girls at Hendon I visited. It is under the same management. That and its companion for boys, at Witcham, are smaller; but judging from what I saw when visiting the Home at Hendon, it is under capital management, and promotes greatly the health of the few children from London their present means allow them to receive. The children grow stronger and recover health, and leave the place with sorrow. The home is in a village sweetly situated about a half-hour's ride from London. A conservatory and large playground and open green fields are adjacent, and to all of these the children have

free access. From three to four hundred children have each passed three weeks or a month there during the past summer. Only those who can walk about are received. If confined to the bed they are returned to a hospital or to their home. They have plenty of good wholesome food and fresh air, and the physician visits the place chiefly to see these remedies are freely administered.

In the report of the directors, 1870, I find the following:—

“It would be superfluous now to enlarge upon the great advantages which attend the careful working of Convalescent Institutions. Dr. Chadwick says that ‘no town hospital will be considered completely fitted for the discharge of its beneficent functions unless there be associated with it a Convalescent Institution at some distance in a country situation.’”

And this last remark naturally leads me to give a brief description of the magnificent Convalescent Hospital or Home recently opened under the direction, and for the sole use of St. George's Hospital in London.

It is situated a few miles from London, but fully removed from its noise and smoke, in the midst of a beautifully diversified, undulating country. It opens to the South, and the sun bathes it all day long. It commands an extensive view of at least a five or six miles' radius over hill and dale and woodland and cultivated fields. Flocks and herds quietly graze within view of the place, and the rooks caw over the adjacent fields. Everything is redolent of country life. It is a spot that of itself would prove a balm to many a sick soul wearied and almost worn down by London labor in a London atmosphere. It arose in this wise.

Mr. Atkinson Morley was one of the most active of the governors of St. George's Hospital. That institution needed more accommodations and Mr. Morley had determined to enlarge it. But difficulties arose about getting the land adjacent to the institution in London, and a suggestion was made, why not build a new establishment in the country which may prove a convalescent home as well as really a ward of the hospital? The result was that Mr. Morley left by will £150,000 for the object. By direction of the lord chancellor about £50,000 have been used in purchasing the land and erecting the building,

leaving thus a large balance to meet current expenses. It has an imposing but very neat appearance. It is evident that while taste has presided in its erection, simplicity and economy have been sedulously attended to. It is built in the form of the letter T. The wards are grand in breadth and length, and fifteen feet from floor to ceiling. Ample room is given to each bed. The windows open to the south. The superintendent is allowed at present to receive one hundred patients only, fifty of each sex. It was opened less than a year since, and no report has yet been printed of the results. But no one can visit it and doubt for a moment of the immense aid it is destined to give its metropolitan parent, from whose wards alone the invalids are to come. The two are merely complementary, one of the other. Similar institutions ought immediately to arise in all the large cities of this country. Will Massachusetts take the lead in this most beneficent of sanitary measures?

The two methods of public hospital and of private benevolent subscriptions might easily be united. In Boston, for example, what prevents the united efforts of the various hospitals and of the Boston dispensaries with private charity establishing a convalescent home in some healthy suburb of the metropolis? And why should not Worcester, Lowell, Lynn, Fitchburg, &c., have each its "*sanitarium*" of the same nature? I suggest these facts and these reflections to the Board, and through the Board to the people of Massachusetts, in the sincere hope that they will tend to the practical result *of the establishment of such institutions wherever they may be needed in our State.*

VIII.

SEWAGE. WHAT SHALL WE DO WITH IT? THE EARTH-CLOSET.
IRRIGATION OF LAND. DRAINAGE TO THE RIVERS OR SEA.

There is no single subject that is attracting more attention in England, and which excites (strange as the remark may seem to some people in Massachusetts) more heated partisanship,

than the vast questions looming up under the various names of "earth-closet," "water-closet," "sewage," "its danger to health," "its widespread and fatal waste," "its utilization as a manure," &c. In other words the great sanitary question of to-day throughout Great Britain is the economic removal from houses of what is deleterious to man, and the proper use, as a source of income, of what has been heretofore wholly wasted. Thousands of pounds sterling are annually sent from England to Egypt to gather up the old mummied remains of past centuries of men, or merchant vessels sail round the world in order to gather the fæces of birds, that perhaps for equally long cycles of time have brooded over some one or more of the beautiful islands of the Pacific Ocean. And all this expense is incurred, while actually throwing away immense quantities of a material having the highest fertilizing qualities.

These vexed questions cropped out and were bandied about from section to section of the meeting of the British Association for the Advancement of Science, recently held at Liverpool, and presided over by the celebrated Huxley.

First. The section on health spoke often of it in regard to sanitary measures. Then it occupied an entire session of the engineering department. Finally, it absorbed much of another session of the chemical section in hearing public reports on the subject, and in listening to the appeals of Mr. Forbes for his plan of so "*throwing down*" all the substances deleterious to health, while saving *them* for manures; and he informed us that he did that so thoroughly and cleansed the sewage water of the Thames. Mr. Forbes was willing to pour into a wine-glass a portion of the water thus purified and, martyr-like (as some of us thought), sipped it in our presence to prove its perfect innocuousness and sweetness! These questions, more than any other, were in fact the *marplots* of many sections and had to be frequently suppressed, or rather *repressed*, by the presiding officer of the particular section in which it appeared. For example, the chemist kept the discussion simply to the chemical aspects of the question, and all engineering or simply sanitary ideas were sedulously kept away. They had, strictly speaking, no right in the laboratory. And so it was with the other sections. I mention these facts simply to prove the great and wide-spread interest in the subject.

In the social science programmes, widely distributed during the meeting of the British Association, it was distinctly brought out as a reason for going to Newcastle-on-Tyne that the subject of sewage would be thoroughly examined in all its bearings upon the health and prosperity of the community. Induced by that fact I attended that meeting. The subject was every day brought up in some way or another in the health section, and I soon found that partisan violence was not confined to republics alone, nor to political parties, nor could theology ever produce more bitter denunciations than were poured out by one party upon the other upon this subject. If I had not been amused I should have been indignant at hearing men whose works I have read for a quarter of a century, and thought were men of consummate wisdom, sagacity and coolness, use language worthy of Billingsgate toward an unlucky and persistent supporter of the "earth-closet" idea. This poor, abused article, which many have found so serviceable to their houses, and private rooms, would have been utterly annihilated if the venerable statistician and writer on health could by any word of his have gained that end. One opponent of this unhappy article declared, for his part, that he was unwilling to "take counsel" from so foolish a creature as the cat who, from the time of Noah, has quietly been teaching what Rev. Mr. Moule proclaimed, *ex cathedra*, only a few years ago. Dr. Farr at length came to the mediation of both parties by suggesting that, after all, both had the same object at heart, viz.: the disinfection and removal of unwholesome articles from our homesteads, and the only diversity of opinion was on a minor point, viz., the method to be pursued for that disinfection and removal.

Surely a subject that excites so much attention in England as a sanitary and economical and, incidentally, a vast engineering measure deserves our candid attention. I cannot throw much light upon the subject. Nevertheless, as I looked into some of the practical schemes now in operation, I propose to give to the Board the results of my experience in this matter. I begin with the

EARTH-CLOSET.

I saw this in full operation in two places, viz.: at the villages of Halton and Beverly near Tring, and at the International Hos-

pital at Bingen on the Rhine. In all these places it was a perfect success. Halton and Beverly are small villages containing about fifty families each. Till Mr. James, an intelligent gentleman residing in the neighborhood, introduced the earth-closet system, every family either had its own privy close to its own premises, or used one in common with others, thus contaminating, as I learned on inquiry from the tenants, the houses in which they lived. About five years since Mr. James, being annoyed by effluvia from the privy adjacent to his own house, and which he vainly endeavored to remedy, tried Mr. Moule's system and with entire relief. Accordingly, with an excellent public spirit, and the sagacity of a practical farmer, he determined to persuade his humbler neighbors to adopt the same. The plan he pursued was as follows: Under a few small sheds he arranged an iron plate three-quarters of an inch thick, about four feet square, and raised upon bricks about a foot from the ground, to allow a fire to be lighted under it. The brick walls rise two feet above it. Thus a large pan or furnace with a strong iron bottom and brick sides is made for drying the earth. A load of earth can be dried sufficiently by one night's subjection to this heat. Half a load answers for a family of six for three months. He has used upon his land from eighty to ninety of such loads, after having passed through the closets twice. The result has been excellent. All the crops have been superior to those produced on neighboring estates treated on the old plan. The manure acts better than London manure or guano; especially does the amount of grass very greatly increase in quantity and apparently in quality.

Meanwhile the villagers find a great relief from the use of it.* All odor is absolutely removed—what was a nuisance and discomfort, to say the least, headaches, &c., not to allude to higher dangers which some sanitarians claim to come from, and which do at times undoubtedly come from the taint of privies and bad-smelling drains; all these have disappeared. I conversed with the villagers, and all who have employed it like the method. A man is kept continually employed by Mr. James to dry the original earth, to carry enough for a week in turns to the various houses, and to remove that which has been

* It is used now by five-sixths of the families, and in two schools of 200 children and with equal success in all.

mixed with human excreta, liquid and solid. This by the subtle alchemy of nature, is found to be simply a dry, disintegrated pulverulent gray mass of inodorous matter. Even paper wholly disappears in it. The accumulations from the various families are placed under sheds opened in front, so that free access is given to the external air. After three months it is again dried and used anew. I visited these various places, the privies, the sheds, furnaces, &c., and found no perceptibly unpleasant odor, even in that portion most recently taken from the village. It was evident that arrangements could be made for boxes (earth-closet privies) of any size requiring removal, either by the week or year. All would be alike inodorous and cleanly. Surely here was a success in every respect. The village health and the purity of the home were improved, with great pecuniary gain to the far-seeing farmer, and the waste which was previously allowed of valuable manure was no longer possible after such positively good results. The earth-closet cannot be styled a "quackery," as the venerable ultraist of the water-closet system called it at the social science meeting at Newcastle.

I saw the same system carried out at the International Hospital under Dr. Thudichum. At one end of the camp street a furnace has been erected similar to that at Halton. Each hospital tent has its own earth-closet, and it was absolutely devoid of smell, so far as I could judge, and the surgeon in charge had found it to act perfectly as a deodorizer, and without any of the unpleasant accompaniments that chloride of lime and other disinfectants usually carry as a necessary result of their use.* Similar results have followed its use in America, and it therefore should be considered as an invaluable addendum to modern civilization.†

* Mr. Edward C. C. Stamford, F. C. S., *Chemical News*, April 19, and Oct. 22, 1869, advocates the use of pulverized charcoal as being very efficient, being much less bulky than earth. He employs sea-weed charcoal. Mixed with the excreta, the whole soon becomes an inodorous dry mass which can be used again, and if need be reburned. One cwt. of charcoal will serve for a month in a closet used by six persons, and may be allowed to fall into a cess *pit* under the house.

† For a most thoroughly exhaustive examination of the earth-closet, and a detailed account of its use in villages, towns, &c., in England and elsewhere, see Dr. Buchanan's admirable account in the last Report of the Medical Officer of the Privy Council, 1870. I read Buchanan's paper after preparing this letter, but preferred not to alter my own statements, as they did not clash at all with the results obtained by that gentleman.

But it will be doubted whether its use can be extended with sufficient ease to large cities, although the earnest advocates of it claim that it is perfectly easy so to do. I will not pretend to discuss this point, but will describe two visits I made, in order to observe two applications of the water system. They present, both of them, examples of what is now constantly being done in England, viz. : of the carrying away of materials supposed to be always, and certainly at times, very destructive to human health and often causing wide-spread mortality.

A few years ago the Thames became so offensive to the nostrils of all the citizens who came near it, that with one accord the believers in the actual noxiousness of these exhalations from it, polluted as it was by thousands of water-closets, and all others who did not like to have any unpleasant smell come betwixt "the wind and their nobility" even if it be not unhealthy, united for the cleansing of the Thames. Accordingly, the city of London under the "engineering skill" of Mr. Bazollette, made two immense sewers, one on each side of the Thames, from the metropolis down to short distances below the two villages of Barking on one side and Crossness on the other. At these two spots, by means of huge openings closed by an elaborate system of gates, the flood of water from all London, after being dammed up for some hours, is twice daily at high tide let out into the Thames. 1st, To waste all the manurial qualities it contains. 2d, To contaminate the villages near and below these outlets on the Thames. This is strongly urged by some and with some show of argument drawn from special cases of local infection from drains, &c. By others and by thoughtful physicians and sanitarians too, this broad assertion is doubted—as one eminent member of the medical profession (whose works at the present time have much influence) said to me : "It was the *stink* rather than the proved unhealthfulness of the emanations from the Thames that compelled the city to carry the water-closet draining to Barking." This was accomplished at the enormous expense of £4,250,000, or £180,262 per annum, the cost to be paid off in forty years by rating"* 3d, To gradually fill up the Thames, and thus seriously to interfere with navigation. This too is doubted. A parliamentary commission, on investigation declared both of the

* A Chemist's View of the Sewage Question. Chemical News, 495, p. 6.

latter propositions false. But one can hardly see how if sewage emanations be pernicious to Londoners, they should not be so likewise to simple villagers.

I wanted to see and judge for myself, so far as I could by inspection and conversation with the inhabitants, what effects had been produced, and what would be the influence on my own senses of the emanations at the outlet. Accordingly I visited Barking, and fortunately met Dr. Parsons, the officer of the Union in that town, an active, earnest and thoroughly accomplished physician, one too who has the power to examine carefully facts, and to modify his opinions, if need be, under the influence of facts. He had joined with his fellow citizens in protesting against the allowing of London sewage to enter the Thames two miles below Barking. He felt persuaded that it must be injurious. He was called upon by the government commission to present facts, and he began to collect them under the impression that the result would be as he and his fellow citizens had supposed. But he has found that death statistics do not at present (after a lapse of two years' exposure) sustain that view. Seventeen per thousand living is the death-rate of Barking. He was surprised at this result. He remembered, moreover, that he had not been especially called to persons residing near the outlets, and there was no greater amount or peculiar character of disease prevailing there than at other spots in his circle of practice. Dr. Parsons drove me to the outlet. Our course for nearly half a mile was directly upon the top of the drain. Every few yards I saw gratings of iron, which I learned were the ventilators of the sewer, but I observed no special odor arising from them as I had expected. We were driving simply over a smooth greensward. Arrived at the mouth I placed myself directly over the partially running stream. It was low tide, and I could see the whole of the opening. I stood over the ventilator just above the gates, and where I knew that there was a large quantity of sewage water. I was still more surprised at the absence of odor in all these places. The keeper of the gates has a house and rears a family above, and between them and the outlet into the Thames. He assured me that he never observed any peculiar odor, and that his family enjoyed good health.

The inferences I was obliged to make were: 1st, That by

some means unknown to me the excreta had become deodorized during the water carriage; and 2d, That at present there was no proof that this deodorized sewage water of London does actual harm to those dwelling near it. I remembered Boston and other cities of Massachusetts with a sense of, at least, partial relief to my previous thought that a drainage that merely empties our water-closets into the docks around our city must inevitably be injurious to the health of our citizens. It is true that I am not aware of any city in Massachusetts having such *long* sewers as those from London, and therefore Boston, Charlestown, &c., have not exactly analogous circumstances with those of Barking and Crossness.

But there is one fatal defect of London and of all American sewage, and that is its waste. Probably there is no such widespread recklessness of spendthrift prodigality anywhere so noticeable among civilized nations as this throwing away of such vast amounts of this most excellent of manures. We take thousands of tons from the earth annually, and totally ignoring Nature's law of economy, which declares that what has been once taken away must be returned again to earth, otherwise the earth itself will become impoverished and will refuse to labor for us, I say totally ignoring this law, we squander an immense amount of really valuable property.*

Among those who have protested against this wholesale waste none has been more prominent than William Hope, Esq., V. C.,† the lessee of the now famous Breton Farm. By his energy a bill was passed by Parliament at its last session, authorizing a company to use this wasted material. For some private reason the measures intended to be carried out by its provisions have not been inaugurated. Meanwhile Mr. Hope took the Breton Farm under the following circumstances. I visited and examined his works, and propose to give a slight account of what I saw and heard there.

* It is calculated that not less than £1,000,000 is annually thus thrown away by London alone. Digest of Facts relative to the Treatment and Utilization of Sewage, by W. H. Corfield, M. A., M. B. Oxen, &c., &c., for the Committee of the British Association for the Advancement of Science. McMillan & Co., 1870.

† Mr. Hope (see address for London Society of Arts, Feb. 25th, 1870, Journal, page 299, vol. 18) takes the strongest grounds on this matter, and claims that English pauperism is vastly increased by this wholesale waste of material, which if used according to modern science and with modern appliances, would enable a vast deal more of cheap food to be raised.

The town of Romford contains 8,000 inhabitants. It was desirous of a better system of sewage, and having introduced a supply of water, conducted its sewers into the adjacent river. This the inhabitants living below the town protested against as polluting the water they had previously had pure for use. An injunction of the Lord Chancellor was laid upon the town authorities, who, in looking around for a remedy, bethought themselves of using the whole for fertilization of the Breton Farm, about three miles from the town. Accordingly the sewer mouths opening on the river were closed, and a system of drainage by large iron pipes conveyed the sewage to the Farm. For some unknown reasons the plan was not successful, and Mr. Hope came to the rescue, and has taken the land at less than £3 per acre, and as he pays about £6 per acre for sewage from the town, the sum is less than £9 per acre for all expense of hiring land and manure. He commenced twelve months since, and the first crops were put in last March. The result, though in every respect gratifying as a pecuniary investment for Mr. Hope and as a sanitary measure for the town, cannot as yet be thoroughly estimated until after a longer trial. I visited and examined the farm thus laid out for cultivation. It is on a tolerably level piece of ground, but by means of his steam-shovel Mr. Hope levels and arranges, with tolerable ease, very uneven surfaces.

A large cemented reservoir receives the water from the pipes. It is a thick, dark fluid; but strangely enough, scarcely any odor comes from it. It is pumped by a steam-engine into a tank and distributed in a fluid state by means of open iron troughs where the height is too great, and cemented pipes where near the ground. These troughs are a foot and a half broad and equally deep, and rounded at the bottom. The cemented ones have apertures thirty feet apart, with gates for closing when necessary or for communicating with gutters in the ground which run in straight lines 150 to 200 feet. In this way the farm is divided into several rectangular lots which give an opportunity for rotation of crops. The extraordinary growth of every plant thus fertilized draws the attention of every visitor. Carrots, four and a half inches in diameter at their top, and a foot long! Mangolds, twenty-nine and thirty-six inches in diameter, and pressing up like huge monsters from

the ground. Cabbages, huge and compact. Immense beds of rich and firm cauliflowers. Potatoes, eight or nine inches long, and weighing at times two lbs. ! Hay, of delicate fibre and eagerly sought for by cattle, can be raised in three crops annually, and in quantity five acres produced twice as much as twenty-five treated by the usual former method. I leave all these results, however, for the practical farmer and agriculturist of Massachusetts to consider, and will finish this brief sketch of the whole subject with two cautions in a sanitary point of view.

While walking over the ground I perceived that the grass had the rich green usually noticed in wet lands, and my shoes often came into muddy spots, while no spot over the entire surface was dry. The whole land was in fact filled with moisture, doubtless fertilizing and raising crops unheard of previously. But I remembered two well established facts upon which I base two sanitary cautions: 1st, moisture of the soil is now fully proved to be a promoter of consumption in England as in New England. Probably the same law, modified doubtless by circumstances, holds good everywhere. Hence the workmen should not live in houses too near such sewaged earth, but rather on dry, elevated spots a little removed from it.

2d. Sewaged water has heretofore and may hereafter contaminate wells of drinking-water. Hence great caution must be, for the present at least, observed in the use of wells that are in the midst of such earth.

One very serious difficulty arises in the use of sewage water in this country as practised at Breton Farm. The irrigation is continued with ease in the climate of England during the winter. The heavy snows and freezing cold of a New England winter would seriously obstruct similar plans here, and although perhaps these difficulties might not be insuperable, they would have to be taken into serious consideration by any one who should propose to try irrigation in our Northern climate. The same objections do not exist against the earth-closet. The question arises whether at times both methods may not be used, but at different seasons of the year.

FINAL APPEAL.

For all these various sanitary and philanthropic measures what need have I to add a single word of appeal to the capital-

ist and philanthropist of Massachusetts? Is there anything but the *will* and *individual* and *coöperative* action needed in order to inaugurate in our State systems similar to, at least, some of those described in this communication? Who are prepared to give to all laboring men neat and healthy homes? Without these it is all vain to try to raise the people to a proper self-respect, and enable them to bring up their children in a manner worthy of a great and free Commonwealth; and some of these children must inevitably become the future parents of the State.

Who will spring forward to aid the heavily-burdened laborer, or seamstress, or shop-girl, or hospital invalid, all sighing for a breath of country air, and of their abundance will build and amply endow convalescent homes?

What farmer or town will, while removing sources of disease and mortality from house or town, follow the dictates of Nature and utilize their sewage, or at least deodorize it by the use of the earth-closet, or by the more thorough and more expensive plan of irrigation, make use of it?

All these questions I submit to the Board, as guardians of the public health.

Respectfully, your friend and colleague,

HENRY I. BOWDITCH.

APPENDIX A.

SUMMARY OF ENGLISH LAW IN REGARD TO COMMON LODGING-HOUSES.

The two Acts for "the well ordering of Common Lodging-Houses" of England under which the police act, were passed July 24, 1851, and August 4, 1858.

Their provisions are as follows:—

The Act is to be executed either, 1st, by the Commissioners of Police of the Metropolis; 2d, Local Boards of Health; 3d, Mayor,

Aldermen and Burgesses of the Borough; 4th, Commissioners, Trustees or other body by whatever name known, for executing the "Improvement Act" (an Act which was passed relative to paving, drainage, lighting, watching, etc., of any place); 5th, Justices of the Peace acting in petty session for the place.

The expenses are to be charged to the general accounts incurred under each of the above departments.

Notice is to be given to each Public Lodging-House keeper requiring him to register his house.

Which register is to be kept by the local authority.

After one month's notice no lodging-house to be used as such until "inspected and approved" by the "local authority," and registered.

The "local authority" may make regulations for governing such houses, which must be approved by one of the principal Secretaries of State.

Penalties may be imposed by "local authority" for violation of such regulations.

The keeper of a Lodging-House must give notice to the Medical Inspector of cases of contagious disease.

He shall allow the Inspector to enter when he may think proper.

He must keep his premises clean, to the satisfaction of the authorities, and attend to drains, privies, &c.

He may be fined £5 for neglect of any of the regulations, or imprisoned if he do not pay, or for third offence may have his license taken from him.

The above are some of the items of the law of 1851. That of 1853 confirms the above, and adds,—

That unless a Lodging-House keeper can get a certificate of good character the register of his house may be refused.

The "local authority" may require a more perfect supply of pure water.

Sick persons affected with infectious or contagious disease may be removed to the hospital, and their clothing disinfected or destroyed at the public expense.

Reports of those who resort to the Lodging-Houses may be ordered from keepers.

The "local authority" has power to remove nuisances.

CORRESPONDENCE
CONCERNING THE EFFECTS
OF THE USE OF INTOXICATING LIQUOR.

R E P L I E S

To Inquiries concerning the Effects of Intoxicating Drinks on Public Health, received from our Correspondents in Massachusetts.

One hundred and sixty-four (164) correspondents have answered the following question :—

“What, in your judgment, has been the effect of the use of intoxicating liquor as a beverage upon the health and lives of the people in your town, or in the region in which you practise?”

The replies are as follows :—

Very destructive to life and health,	48
Injurious in a greater or less degree,	49
Public health not affected by use in their towns,	16
The people of their towns very temperate,	27
Intoxicating drinks not used in their towns,	5
The effect is bad upon foreigners in their towns, but not upon natives,	4
Useful in the decline of life,	1
Use promotes longevity,	1
Indefinite replies,	13

The following extracts from letters give more information on this subject :—

“I am satisfied that the free use of intoxicating drinks is a moral evil that tends strongly to injure the physical health.”

“Observation has satisfied me that the use of intoxicating liquors as a beverage does not improve the physical or mental system, but is adverse to the best condition of both. I am positive that drunkards die from consumption.”

“As far as my observations extend in a practice of more than thirty years, the use of intoxicating liquors has not been injurious to the health or shortened the lives of those who have used them temperately. The intemperate use of alcoholic drinks, and other excesses to which it leads, has caused the death or shattered the constitutions of many young and middle-aged men in this vicinity ; but rarely do I meet with a very old man who has not been in the habitual use of stimulants in some form, and accustomed at the same time to active exercise.”

“Among the American population, not an individual is known whose health has been injured by drinking. Among the foreign population, there is hard drinking on Saturdays and Sundays,—and in some cases (but few, however) general health has been thereby injured.”

“Intemperance in the use of intoxicating liquors, with the usual concomitants, lewdness and debauchery, are the causes of a very large share of the diseases I am called upon to treat in the State Almshouse.”

“I do not think intoxicating drinks have any general influence on the health of the people in this town. Individuals have, however, been known to be seriously injured. It is not to be generally procured, and those who use it are obliged to submit to long intervals of total abstinence.”

“I have had occasion to see, but few cases of suffering directly from the free use of intoxicating liquors, but these have been sufficient to convince me that such use is detrimental to health and life.”

“Delirium tremens less common now than formerly, but we see, as effects of intoxicating drinks, a trembling gait, and general debility of nervous system, and I have been led to think that these symptoms might be due to adulterations, rather than to alcohol.”

“The health of the inhabitants of this town I do not think is materially affected by the use of intoxicating liquors ; there are those who say they almost die for the want of them.”

"There is no great abuse of intoxicating liquors in this place. Their influence on public health is small."

"I do not think that intoxicating liquor has been used as a beverage to such an extent or degree as to produce a perceptible effect upon the general health and lives of the people in the region of my practice."

"Intoxicating liquor has invariably proved a curse to those who used it as a beverage."

"Injurious wherever habitually used. Has destroyed many lives in the fifty years of my observation."


"Not injurious unless taken to excess."

"Intoxicating liquors have greatly injured the health and lives of those who use them habitually as a beverage."

"As regards the use of intoxicating liquors, I believe that there are individuals who would enjoy better health than they now do if they would use them temperately. But there is vastly more suffering from intemperate use than from abstinence. On the whole, I think we should be more healthy, wealthy and wise if they were entirely banished from society."

"I have very few cases of sickness which I am able to trace to the use of intoxicating liquors. Many aged persons are within the range of my observation who have always used liquors as a beverage without apparent injury. I have the impression that in this region persons who habitually use spirits are less subject to lung diseases than are the average of total abstainers, but I can give no exact data to prove this opinion."

"To answer the question regarding the use of intoxicating liquor as a beverage, we must divide the inhabitants into two sections, natives and foreigners. There is no excess with the former in this community. The foreigners, particularly the Irish, many of them drink freely, and the result is most disastrous to them. Health is injured, and lives prematurely destroyed."



“Intoxicating liquors the source of much existing disease.”

“The use of intoxicating drinks has been so far as I can judge only productive of evil, and he who uses them has need to say often the prayer of St. Chrysostom : ‘ God keep my body from the doctors, my money from the lawyers, and my soul from the devil.’ ”

“The effect of the use of intoxicating liquor is here, as everywhere, injurious to health and destructive to life. Never useful as a beverage, and seldom, if ever, as a medicine. The users are not the only sufferers, but they leave to their children an inheritance of bodily and mental disease.”

“I believe that three out of four adult males use intoxicating drinks as a beverage, or on small pretext, but I see no effect upon health. Those who drink at the hotel, all belonging to the laboring class, are not sick oftener than others, but suffer in their pecuniary and social interests.”

“Intoxicating liquors are extensively used, and by a proportion of all classes. More was used in 1869 than in any previous year since 1857. No disease resulting from its use has come to my knowledge.”

“I think people who use liquor moderately here are less liable to disease than those who do not. They are also as long-lived. Used excessively it produces disease. I think, if liquor was pure, the moderate use would be conducive to health, especially in those of attenuated habits.”

“Intoxicating liquors have injured health and shortened life in proportion to their use.”

“There is no very marked effect on the life and health of our people from the use of intoxicating liquors. The Irish use it most, but only a few instances could be pointed out in which very special mischief can be attributed to it in regard to life or health. Of course there are cases of unthrift, of squandering, of family abuse, &c., such as must naturally arise from the gradually benumbed conscience.”

“Intoxicating drinks have a decidedly injurious effect upon life

and health, and are far too much used in the treatment of disease. Tobacco is doing even more than liquor to undermine the constitutions of the men of this region."

"The abuse of alcoholic liquors is a fruitful source of both crime and disease ; but their use under certain conditions appears to me to be indispensable."

"The effects of intoxicating drinks among our inhabitants have been rather moral than physical."

"The use of intoxicating liquor has a very injurious effect upon our inhabitants. We are but three miles from the New York State line, where liquor is sold freely ; and our poor Irish laborers spend their money for that which brings them only sickness and poverty, with all its privations and exposures."

"The same general law operates here as elsewhere. They who sin through intemperance suffer its penalties. The amount of sickness and the rate of mortality are increased by the use of intoxicating liquors."

"Temperance is the rule ; intemperance the rare exception here. I remember one man who killed himself by the daily use of N. Y. brandy, and another who drank all the N. E. rum he could get, but would drink no other form of spirits, and who was intoxicated the most of his time, who lived to the age of ninety-three."

"The effect of the use of intoxicating liquor has been to ruin health, and shorten the lives of the people."

"Predisposes to fever and rheumatism, and shortens life very decidedly."

"In my judgment a very disastrous sequence of results follows the use of alcoholic liquors as a beverage. They impair the vigor and elasticity of the body, and impede the functions of its organs ; they produce diseases of the nervous system, and I have no doubt of their hereditary influence."

“Injurious always, from first to last.”

“Impaired health, shortened lives, feeble offspring.”

“The cause of much debility and disease.”

“Better health and longer life would have been secured had the population abstained entirely from the use of intoxicating liquors as a beverage.”

“The effects of alcoholic drinks are plainly seen in the families of those who in past years drank to excess. Tobacco is now doing more to shorten life than liquor.”

“When I came here forty years ago there were three stores and four hotels where liquors were sold, and they all prospered,—they sell none now. The difference is very visible. Comparing the past with the present confirms the belief that the use of liquor as a beverage is very injurious; that it often acted as the primary or predisposing cause of hepatitis, gastritis, enteritis and rheumatism. If there was a proclivity to any disease, it often excited that latent principle to action, and hastened it on to a fatal issue. It has been, and still is injurious to the health of the individual, to the health and happiness of his family, and to the treasury of the town.”

“I think that the use of liquor impairs the health, and has shortened the lives of some, especially when used to excess. I think that persons who drink liquor do not bear up under acute attacks of disease as well as those who abstain from its use.”

“The use of malted, fermented, or distilled liquors in this place has affected neither the health or lives of the people to any extent.”

“Intoxicating liquors kill more than all diseases.”

“My impression is, that the use of intoxicating liquor as a beverage not only exercises a very pernicious influence on the moral and

social condition of our people, but undermines health and shortens life."

"I know of but few instances in which such liquors are used at the family table; in those few instances it is mainly wine, and I think it beneficial. The drinking of ale and distilled liquors at secret bars is sufficiently common to come to my attention as cause, direct and indirect, of no little disease. Were open bars allowed I know no reason why this evil should be less."

"On the whole, the effect is injurious. I should, however, make a distinction between the use of intoxicating liquors and the lighter drinks. If we could so manage as to furnish the people with light wines, lager beer, and such drink, and dispense with distilled liquors, I believe that the community would be immensely benefited."

"I have had a large practice among the Germans for twenty years, and my observation has been that they are remarkably free from consumption and chronic diseases. I have attributed it to their free use of lager beer. I believe that the moderate use of the lighter drinks is beneficial."

"Many persons can use liquor as a constant beverage without injury to their health, but I am confident the majority cannot, and are injured by its daily use. My judgment is that the health of the people would be better and their lives longer without the use of intoxicating liquor as a beverage."

"People very temperate. A very few persons use liquors excessively and thereby injure their health and perhaps shorten their lives. One instance only, I now remember."

"I know of no disease in this town traceable to the use of intoxicating drinks."

"From a comparison of the habits of life of the aged persons, who have died here since my remembrance, I have formed the opinion that a moderate use of spirits has no tendency to shorten life, or impair its vigor; while an immoderate use tends to produce both these results. I am not partial to its use in consumption. In cases

attended with bleeding from the lungs it shortens the disease by shortening the life of the patient.”

“Effects injurious, and more so of late from the bad character of the liquors sold.”

“There are cases where the use of intoxicating liquor as a beverage is useful, especially in the decline of life. Where the body is gradually becoming weakened by age its use in moderate quantities, of good quality, taken with regularity, has a tendency to keep up the tone of the system, and to prolong life.”

“Unfavorable to health. The same may be said of strong tea and coffee.”

“When used temperately such liquor has seemed to do no harm; when used intemperately its effects are disastrous.”

“I cannot see but that moderate drinkers are as healthy as any.”

“I have observed no peculiar effects on health in this town from the use of intoxicating drinks, but the habit of opium-eating and the use of preparations of opium demands attention.”

“We have little intemperance, but it is found to be invariably destructive to health and life. Moderate drinkers suffer from the habit when attacked by ordinary diseases.”

“Happily we have no grog-shops, no place where liquor is sold. But very few of our people are habitual drinkers. The blighting curse of rum is not upon us.”

“We see but little disease caused by intoxicating drinks. In more than thirty years I have seen not more than two or three cases of delirium tremens. Among the few persons using such drinks, we see diminished ability to labor, and such diseases in their families as are engendered by want, care and discouragement. All

cases of *gangrene senile*, which have come under my observation have been persons accustomed to indulge in strong drink. Most cases of cancer have been either among hard drinkers or their immediate descendants. My own belief is that the use of intoxicating drinks, combined with the free use of pork as food, constitute a prolific source of cancer. Confirmation of this belief, of course, needs a far wider sphere of observation."

"This is a quiet farming town, without a railroad until the present year, and there have been but few persons addicted to the use of intoxicating drinks. But in such cases the effects are unequivocal. Sometimes death from delirium tremens, or from accidents occurring while intoxicated. In others, where the liquor is used more moderately, its subjects are rendered more irritable, more easily affected by disease, and less likely to recover from it. I have had many patients whose life or death was apparently determined by their previous habits as regards the use of intoxicating drink. I have often noticed also that one or more of the children of a drinking parent possessed a feeble constitution, or mental incapacity, or both, and perhaps a scrofulous tendency. But this is not true of the children of all such parents. The propensity to drink is also sometimes transmitted, although not very generally, because the children are warned by the effects which they see. I recall the family of one notorious drinker, but one of whose children was addicted to the habit, but several of whose grandchildren (and not sons of the drinking son), inherited the propensity. On the whole, therefore, I judge that the effect of the use of intoxicating liquor as a beverage is deleterious, and frequently ruinous to the health, and that it very often shortens the duration of life."

"There is a great deal of intoxicating drink sold in this town. The population is but little over two thousand, and there are probably a dozen places where it can be bought. I do not propose to discuss the effect of this from a moral point of view, but to speak of it physiologically. I am of opinion, as the result of observation, that the use of these drinks is the cause of ill health not so much to the drinker himself as to those with whom he holds intimate relations. It is very seldom that I am called to a case of sickness where I can say that alcohol was the direct cause of the disease. Excluding cases of disease of the liver and kidneys and delirium tremens, it seems to me that habitual drinkers enjoy as good health and are as long lived as their more temperate brethren. I am very

seldom called to treat a case of consumption in an habitual drinker, and when we do find such, the disease seems to be brought on by the attendant vice, debauchery and poverty, rather than by the spirit-drinking itself. I do not find that spirit drinkers are more subject to inflammatory diseases.

“I have run over my day-book far enough to include the last one thousand cases for which I have prescribed, and among them all I find but eleven caused by alcohol. These eleven cases apply to seven individuals, as some of them applied for treatment at different periods. I have not been able to see that any of the children born in this town during the treatment of these one thousand cases have inherited any physical weakness or any disease from their parents being addicted to drink. This does not prove that the inordinate use of liquor is not at all injurious to offspring but it seems to show that individuals may at times even drink to excess and still the offspring not be injured by it. I know a number of men who have large families of healthy children and yet during all their married life have been hard drinkers. One reason for this may be that the children were begotten before the intemperate habits of the fathers had injured their systems. The effect of drunkenness of mothers upon their children would no doubt be worse. I know of but one such, and her children born since the habit became confirmed seem to be as sound as the others; but one case is not enough for proof. With few exceptions, the bad effect of spirit-drinking on the health of the people of this town, as they now drink, is an *indirect* one,—not so much affecting the drinker as his family,—subjecting them to hardships and mortifications, and by the well-known weakening process of these influences, rendering them more open to the inroads of disease. The practical conclusions which may be derived from the preceding observations are these: Moderate drinkers are not more subject to disease than the strictly temperate, if we except cirrhosis, and perhaps Bright’s disease. Immoderate drinkers suffer from disease which is attributable to the collateral dissipation and exposure rather than to the spirit itself. The proportion of disease caused directly by drink to disease of all kinds is only one per cent. in my experience.

“The children of moderate drinkers are as perfect as those of the strictly temperate, both physically and intellectually. The children of fathers who were excessive drinkers, unless their fathers were intoxicated during the act of their generation, are apparently equally sound. The effect of alcohol on the physical economy, in not excessive quantities does not appear to be the direct cause of any of our prevailing diseases.

“That alcohol, used to excess, has an injurious effect on the moral and intellectual faculties, and that it leads to vice of all kinds, and is the cause of great domestic misery, and is thus the *indirect* cause of much physical suffering, there can be no doubt.”

“This may be called a temperate community. The effect of the use of intoxicating liquors is by no means uniform. While I can recall many instances of ill-health from its use I can recollect very few where it manifestly shortened life. There have been many notable instances of great age in men who have always drank.”

This closes the remarks on this subject by our correspondents in Massachusetts. We now present the correspondence from foreign countries.

The following letter was addressed by the Chairman of the State Board of Health to a great number of representatives of the United States Government in every part of the world :—

BOSTON, Feb. 23, 1870.

DEAR SIR :—The State Board of Health of Massachusetts is, by law, ordered to study the influence of intoxicating drinks on the health and prosperity, etc., of our people. It desires to get information from various countries in regard to the whole subject. I would therefore respectfully ask you to be kind enough to tell me :—

1st.—What are the chief intoxicating articles used in ———.

2d.—What amount of crime is produced by them; and their effects on the health and prosperity of the people.

Under the last question we would like to have your opinion (if you are willing to give it) as to the relative amount of intoxication in the country where you are now residing, and that seen in the United States.

We would like also any official statistics of the amount of intoxication and of crime resulting therefrom.

I remain, very respectfully yours,

HENRY I. BOWDITCH, M. D.,

Chairman of the State Board of Health of Massachusetts, (U. S. A.)

The following replies were received previous to January 14, 1871.

ANCONA, May 12, 1870.

DEAR SIR:—In answer to your communication dated the 23d February, ultimo, requesting me to give information respecting intoxicating drinks used in this country, and their influence on the people, though only a short time living here, I have been able to form the following ideas.

The Italian people as a body are not addicted to strong drinks. The principal drink of the country is wine, which is not intoxicating except when taken in great quantities. Spirits are only indulged in by the lower orders, and that in a very small proportion.

As for crime being committed under the influence of liquor, such a thing I may safely assert is unknown, and in case crime is committed under the influence of drink, in this country, it is taken as an extenuating circumstance in favor of the accused, a proceeding which is not always allowed in countries where intoxication is too prevalent.

The manufacturing and sales of liquors of all descriptions are perfectly free, government in no way interferes, nor is a license of any kind requisite for the sale or manufacturing of liquors.

You ask for a comparison of the amount of intoxication in this country and the United States. There is none; unfortunately the habit is too extended in the States to admit of a comparison with this country.

To sum up in a few words, intoxication as a general rule does not exist in this country, and in consequence the health and prosperity of the people are not in any way injured from the effects thereof.

I am, sir, very respectfully, your obedient servant,

ORRIN J. ROSE, *U. S. Consul.*

ATHENS, May 20, 1870.

SIR:—I have now the pleasure to reply to your circular letter of the 23d of February last, which, as I have before advised you, did not reach me until the 28th of April. You ask, 1st.—What are the chief intoxicating articles used in Greece?

The chief intoxicating article is wine; the native growth of the country. It is of pure grape juice, fermented naturally in barrels, without any artificial aid beyond the addition to the fresh must when put in the barrels, of about ten per cent. of common resin gathered from the bark of the pine-tree. This wine is very cheap, costing about thirty leptas an oke, or 15 leptas a bottle (say three cents). But little is exported, and that chiefly to Turkey and Russia. It may be said to be the universal drink of the people.

The average annual consumption in the city of Athens,—which contains a population of nearly 50,000 souls,—is about 1,900,000 okes of resined wine or 3,800,000 bottles. Of other spirits the estimate is 40,000 bottles. Rum and brandy are chiefly consumed by foreigners, of whom the greater part are sailors. The Greeks consume also, in small quantities, a spirit called raki, which is distilled from the lees of wine and from figs. Alcoholic drinks, spirits, rum, etc., are very deleterious in these warm climates. This fact, and the comparative high cost of these stimulants, limit their consumption. The light wine of the country on the contrary is generally regarded as harmless in its effects, if not positively wholesome, when drunk in moderation. A medical gentleman who has had large experience among the peasantry, informs me that “when not abused the tonic effect of the resined wine is rather beneficial than otherwise, its bitter pungency acting against the feverish influences of the summer miasmas.” “In the village of Menidi near Athens,” says my informant, “I know an old priest who, from the testimony of his neighbors, has consumed daily, ever since he was an adult, no less than two okes (four bottles) of the wine of the country at each of his meals, besides extra glasses at odd times, making in all about six okes or twelve bottles per day. This man is now ninety years old, is hale and strong and continues the same practice still.”

2d.—What amount of crime is produced by them and their effects on the health and prosperity of the people?

It is very difficult to make an estimate of the amount of crime produced by intoxication, where no statistical information on the subject can be obtained; but from what has been already stated with regard to the character and use of the wine of Greece, you will infer that, as a general thing, crime cannot be attributed to this cause. So far as figures go it may be assumed that not more than one-sixteenth of the crime committed can be said to arise from intoxication. The Greeks are eminently a temperate people, and excepting on high feasts and holidays, a drunken man is rarely seen. My own observation is not a fair test as I am not frequently in quarters of the city where tavern brawls occur, yet it is worthy of remark that during two years' residence in Greece I have not seen as many as two Greeks in the condition called “dead drunk;” while it is a not uncommon sight to see sailors from foreign ships, reeling through the streets in various stages of intoxication. Drinking may occasion brawls and quarrels leading to high words and much volubility of speech,—for the Greeks are easily excited and much given to profuse language,—but I may say they seldom come to blows or to worse results, such as homicide, in consequence of excessive drink-

ing. This is to be attributed, chiefly perhaps, to the quality of the liquor drank, the wine of the country, as has been already stated, not having the same effect as spirits in this respect. The Greeks also are an orderly people, easily excited to anger it is true, which, however, is but momentary. The following return of deaths in the city of Athens (taken from the published register), during the last nine years, will show what an astonishingly small amount of deaths were due to strong drinks or delirium tremens. You will observe the proportion of foreigners is very great. These form scarcely one per cent. of the whole population, and the result is owing to the strong alcoholic drinks which they consume, while the Greeks, as a rule, confine themselves to the light wine of the country.

Registered Deaths in the City of Athens from the effects of Strong Drinks, "Encephalopathie Crapuleuse" and "Delirium Tremens."

YEARS.	Natives.	Foreigners.	Total.
1860,	2	1	3
1861,	4	3	7
1862,	2	2	4
1863,	3	1	4
1864,	4	1	5
1865,	5	2	7
1866,	—	2	2
1867,	2	3	5
1868,	1	1	2
1869,	3	—	3
Total in a population of 50,000,	26	16	42

This statement may not be perfectly reliable owing to the fact that the certificate which must be given by the physician, before permission for burial can be obtained, is sometimes incorrect. It may happen, when the cause is habitual intoxication, that sensitive relatives induce the physician to call the disease by some other name. It is, however, well known that cases of delirium tremens are so very rare in Athens, as to excite the astonishment of the medical faculty who are unacquainted with the country.

3d.—What is the relative amount of intoxication in Greece and in the United States?

The relative amount of intoxication is very small indeed compared with that of most other countries. There are no statistics of intemperance in Greece, but from what has already been said you

will perceive that there is no comparison whatever in this respect with the intoxication and intemperance which prevail in the United States. Probably there is less intemperance in strong drinks here, than in any other part of the world, unless it be in Turkey and other Mussulman States.

I remain, sir, very respectfully, yours,

CHAS. K. TUCKERMAN.

BASLE, SWITZERLAND, 8th June, 1870.

DEAR SIR:—Your letter, making inquiries in regard to a subject to which I paid a great deal of attention, owing to its great vital importance in the United States, viz., the cause of temperance, I received in due time; the very wish to answer it fully, supported by documents of official statistics, caused my delay in writing to you sooner. Some two months ago I tried to get official information from the canton of Berne, where, owing to peculiar circumstances and laws, strong alcoholic liquors (schnapps) are manufactured and consumed, and where there is more immorality, crime and misery, it is said, than elsewhere in Switzerland; but failed to receive it up to this day.

Hence I answer the questions desired as best I can from my own observation and study.

Question 1st. What are the chief intoxicating articles used in Basle and vicinity?

Answer 1. This being a border state of France and Germany, where wine grows very abundantly, and costs retail from 10 to 25 cents a pint only, a great deal of wine is consumed even by poor persons and day-laborers (wood-cutters receive a bottle a day, servants from two to three bottles a week in each family). Beer is more of a luxury, and indulged in more freely by the middle and higher class, besides wine, every day, Sunday not excepted.

Question 2. What amount of crime is produced by these intoxicating drinks, etc.?

Basle is one of the most orderly, quiet and moral cities in Europe, I believe, and one of the richest of its size. In its vicinity there are immense silk ribbon factories. The higher and middle classes enjoy excellent health, and are prosperous.

The working classes, gaining small wages, consume proportionately a good deal of cheap wines as a substitute for more substantial food, such as meat, which factory people obtain, perhaps, only once or twice a week.

There is nothing like the same amount of intoxication witnessed here as in the United States, or other countries, where strong drinks are resorted to instead of wine or beer, and is always of less dangerous consequences, rarely leading to fighting, if ever to murder. Drinking is here connected with amusements, conversations, music, etc., indoors and outdoors; does not take place at bars, or secretly.

I am, very respectfully, your obedient servant,

J. C. ERNI, *United States Consul.*

LEGATION OF THE U. S. OF AMERICA IN SWITZERLAND. }
BERNE, July 27th, 1870. }

SIR:—Your circular letter, asking for information respecting the use and effects of intoxicating liquors in Switzerland, was received at this legation in April last. At the time, I was absent on leave from the State Department, and, on my return, about the 1st of June, I began making inquiries with the hope of collecting materials for a satisfactory reply to your questions. Considerable time has elapsed, and I regret to say that I have been able to obtain only very insufficient data for this letter. The evils consequent upon the intemperate use of intoxicating drinks have not attracted as much attention here as in the United States, perhaps for the reason that they have not been as seriously felt. Nevertheless, in some parts of Switzerland, and especially in the canton of Berne, intemperance prevails to such an extent, that recently, the cantonal legislation has sought to find measures for abating the evil.

The few statistics that I have been able to collect on the subject of the use of intoxicating drinks in Switzerland relate to the canton of Berne. That canton, however, includes a fifth part of the population of Switzerland, and it is the part of the country where, I am assured, the greatest amount proportionately of intemperance is found.

Your first question is: "What are the chief intoxicating drinks used?" These are wine, beer, and a species of brandy, or schnapps, distilled from potatoes, or from the pulp of grapes after the wine has been pressed out. French brandy, or kirschwasser, and various liquors imported from abroad, are also used to some extent, but very little by the mass of the people.

From official sources, I learn that the annual average importation of wine, beer and cider, in the canton of Berne, which contains a population, in round numbers, of 500,000, amounts to from eight to nine million maas (a Swiss maas is equivalent to one quart and three gills English measure). A large quantity of beer is manufactured in

the canton, but I have not been able to obtain the approximate amount. There is also manufactured from the vineyards of the canton about 1,750,000 maas of wine per annum. The annual importation of brandies and other spirituous liquors reaches about 700,000 maas, and about the same quantity of spirits, principally schnapps or potato brandy, is distilled annually in the canton. The greater part of all the above-mentioned drinks is consumed within the canton. But little is used except for drinking purposes. After making due allowance for the large consumption by travellers during the summer months, there still remains sufficient ground for the conclusion that the people of this part of Switzerland are not the most temperate people in the world.

Your second question is: "What amount of crime is produced by the use of intoxicating drinks, and their effects on the health and prosperity of the people?" Upon this subject, I sought for information from the Federal Bureau of Statistics, the chief of which, in reply to my application says: "We have no statistics on the subject. It may, however, be taken as granted that manslaughter and many acts of violence are frequently the result of intemperance. In cases of suicide, without considering other causes, many persons destroy themselves while in a state of intoxication. Of fifty-three suicides in the year 1868, eleven were intoxicated when they committed the act, or were notorious drunkards. In this canton, as elsewhere, one may see that the health and prosperity of those who have fallen into the habit of drunkenness are soon destroyed. Many families are ruined by this vice, and the children of drunkards tainted with hereditary disease."

I am told that the evil effects of intemperance here are chiefly visible in that class of the population addicted to the drinking of schnapps. This liquor is very cheap, and is the principal stimulant used by the poorer classes. Its manufacture and use have greatly increased of late years. It is drunk by the people of the rural districts, who either cannot afford or cannot obtain other liquors. Since Switzerland has been traversed by railroads, and is annually visited by multitudes of foreign travellers, the prices of all kinds of country produce have largely increased. The poor classes are not as well fed as formerly. The excellent milk of the country, formerly consumed by the people, is sold to the hotels, or manufactured into cheese for exportation. Many of the people live almost exclusively on potatoes, and a writer on the subject, whose essays have attracted a good deal of attention here, Mr. J. F. Schneeberger, of Berne, attributes the craving for alcoholic drinks, so much more noticeable now than formerly, to the lack of nutritious and proper food.

The general impression among those with whom I have conversed on this topic, is that the wines of the country are wholesome, and that the best method of introducing a temperance reform would be to bring wine or beer within the reach of the masses of the people, and discourage the use of stronger drinks. A very intelligent gentleman at Lucerne, a member of the cantonal legislature, with whom I conversed on this subject, said that some years since he had charge of enrolling the citizens of that canton subject to military service, and was struck with the difference between the people of certain valleys where wine is produced, and has always been a common beverage, and those of other districts where wine is not used, and schnapps is a common drink. The physical superiority of the former class was, according to his account, very striking, and the percentage of able-bodied men in the wine-producing districts very much the greater. He attributed the difference, in great part, if not to the positive virtues of wine as a beverage, at least to the positive evils produced by schnapps-drinking. Nevertheless, I suspect there were other causes. In the wine-producing districts there is usually a more generous soil, a milder climate, and more wealth among the people, who are consequently better housed and better fed, and might be expected, as a consequence, to exhibit, in their persons, the superiority which he remarked.

Last year two laws were enacted by the cantonal legislature of Berne, one having for its object the restriction of the use of distilled spirituous liquors, by increasing the tax on their manufacture and importation, and diminishing the taxes on wine and malt liquors. The other seeks to protect the public from adulterated liquors, provides for the inspection of distilleries, in order that only such apparatus shall be used as will produce an article as little injurious as possible, and affixes penalties for the violation of the law. A small tax still remains on imported wine and beer, and it is proposed that this shall be repealed in order to encourage the substitution of such beverages in place of stronger drinks.

Some efforts have been also made to counteract the immoderate use of strong liquors by the private and voluntary action of citizens. A temperance society was formed in the city of Berne several years ago. The members abstain from distilled liquors, and the society publishes prize essays for the instruction of the people in regard to the injurious effects of the immoderate use of intoxicating drinks.

You request me, finally, to give my opinion as to the relative amount of intoxication in this country and that seen in the United States. As my residence here has been comparatively brief, and my opportunities of seeing the common, every-day life of the people

somewhat limited, my opinion is liable to be erroneous. Judging from what I have seen, I must say it is my impression that, while the drinking of intoxicating liquors is much more general here than in the United States, there are fewer instances of actual inebriation than are witnessed there. As far as my observation has extended, it is not so common to see men reeling or noisy, under the influence of intoxicating drinks, upon the streets here, as in most parts of the United States with which I am familiar. In all the towns of Switzerland there is a market day once in each week. Almost the whole rural population of the vicinity seem to visit the city on that day. The cafés and restaurants are filled with people; there is apparently a great deal of drinking, and towards night, it is not unusual to see occasionally a person intoxicated. But I think that, under similar circumstances, much worse results would be witnessed in the United States than are seen here on such occasions. This is perhaps due in part to the fact that the people are in general of a less excitable organization than ours, and in part to the fact that the American custom of "treating" is but little practised here.

Regretting that I have not been able to collect more complete statistics upon the subject,

I remain, very respectfully, yours,

HORACE RUBLEE.

BERLIN, April 26th, 1870.

MY DEAR DR. BOWDITCH:—I have your letter of the 18th ult. The German intoxicating drinks are made of brandy, distilled from rye or from potatoes. The "schnapp" is but such brandy or spirit distilled with sugar. The beer used here cannot be called an intoxicating drink. I have no opportunity of observing the people in their places of indulgence, and cannot offer an opinion of my own on "the relative amount of intoxication in this country." Those of whom I inquire do not think the health and prosperity of the people greatly injured by the use of spirituous liquors.

I am ever, most truly yours,

GEO. BANCROFT.

BREMEN, May 7th, 1870.

SIR:—An answer to your *first* interrogatory contained in your favor of 23d Feb., will necessarily answer your second, namely: "What are the chief intoxicating articles used in Bremen and

vicinity?" No intoxicating or alcoholic spirits are used in Bremen. Wines and beer are the favorite beverages, and are used and consumed in almost unlimited quantities. These are so cheap as to come within the means of all classes, more beer however being consumed by the middle and lower classes than any other. My observation has led me to conclude that no evil grows out of the use of these. For now, after quite a year's residence among the people here, I have yet to see the drunkenness and rioting which prevail in most of our American cities; the natural and consequent results from the sale and use of the intemperate spirituous liquors.

I am, very respectfully, yours,

R. M. HANSON, *U. S. Consul.*

U. S. LEGATION, CONSTANTINOPLE, May 27th, 1870.

SIR:—In reply to yours of February last I beg to say :

1. The intoxicating drinks most in use in Turkey are raki (popularly called *mastica*), and brandy. The former is simply rum flavored with mastic, to give it an aromatic taste. The rum was for the most part imported from New England, but this importation has now almost ceased, being undersold by the rum of Austria and France. Brandy and Cognac are imported from France England.

2. The use of intoxicating drinks is confined to the Christian populations, and of these the Greeks are the most addicted to them. Even among those who indulge in spirituous liquors intoxication is very rare, and habitual drunkenness is comparatively unknown. Sobriety is the rule and intemperance the exception. Drunken men are seldom seen in the streets of this city, and when a case occurs, it is generally a foreign sailor. The English sailors, I am sorry to say, are conspicuous for drunken habits on shore. Their intemperance is a fruitful source of outrage and crime.

The Mohammedans by religion and habit are temperate, and they regard drunkenness with aversion, as degrading to human nature. They abstain as a rule, from the use of intoxicating drinks. None are sold in their *cafés*, and by imperial authority they are not allowed to be offered for sale in the vicinity of the Imperial Palaces, government offices, kiosks frequented by the Sultan, and the military barracks. At the review held last year on the plain of Huniari Iskelepi, of 30,000 Turkish troops before the Sultan, the Empress Eugenie and the Emperor of Austria, and in the presence of 50,000 spectators, not a drop of liquor was sold in the *cafés* and

refreshment tents. Not a single drunken man marred the order and decency of the scene. It has never been my lot to witness a more respectable and decorously behaved multitude. The same good order prevails at all Turkish festivals.

I regret to be obliged to admit that Mussulmen exhibit a vast superiority to Christians in their abstinence from intoxicating drinks.

3. I have no means of furnishing you reliable data as to the amount of crime produced in Turkey by intoxicating drinks, as no statistics are collated here, except a few on commercial matters. I am safe in saying, however, that it is inconsiderable. The habitual use of ardent spirits in this country leads to gastric fevers, to apoplexy, paralysis, and a rapid decay of physical and mental health. He who is careful of his health abstains from them altogether, total abstinence being the wisest and safest rule.

I think it proper to add that wines, native and foreign, are cheap, and in general consumption among Christians. When not adulterated by drugs, and drank moderately at meals as beverages, they are regarded by physicians as wholesome in their influence.

I am sir, very respectfully, your obedient servant,

E. JOY MORRIS.

CONSTANTINOPLE, TURKEY, July 12th, 1870.

SIR:—Your letter of inquiry as to the varieties of wines or spirituous liquors used in Greece, and their apparent effect upon the character and behavior of the people, was received two months since.

Immediately after I commenced a somewhat extended tour in the Peloponnesus and islands, and found neither opportunity nor leisure to furnish the information you desired.

And now I can only give my own impressions, formed after such inquiries as I have been able to make, and subject to mistake. Should I be able hereafter to get at any more definite facts I will make it a duty to communicate them.

First,—the kind of intoxicating liquors used in Greece is almost exclusively wine.

There are manufactories of rakée at Calamas, and at other places in the Peloponnesus, but usually the people prefer to drink the wine, and only take the rakée when much exhausted, as a stimulant.

I have never seen in an eight months' residence in Greece, a man make himself drunk with rakée. This rakée, it should be said,

is exceedingly strong. As to the Greek wines, probably they are purer than those of any other country in Europe.

When one becomes habituated to the resinated wine, which is the common drink—the poorer people liking no other so well—he discerns the purity of the wine from all other admixture, and under the cloak of the resin can distinguish easily the different grapes from which different wines have been made.

The proportion of resin varies from $\frac{1}{4}$ of 1 per cent. to 5 per cent. Its addition is considered to make the wine more healthy, to facilitate digestion, and to counteract any ill effects which the lime-water of the country may have.

Passing the other day, from Athens to Smyrna, as soon as I tasted the light wine of that country, I could perceive the spirit in it to a degree which I had not known in Greece. There is perhaps no country in the world where wines are cheaper than in Greece. New wine is sold in Arabia in the fall for four or five cents per gallon. Before the grape disease of '53, '54, '55, '56, &c., there were times when it was sold for one or two cents. On the high plain of Arcadia, and in the mild valley of Acarnania—in fact in all of western Hellas—wine with bread and olives and oil makes a chief article of food; babies, even, drink it.

It is the most abundant of all products, and the easiest procured. In Acarnania you will often find wine when you would hardly find bread.

I should say that from the purity of the wine used, that an excess of it caused little injury to the health, and ready as the Greeks are to quarrel, I am inclined to think that comparatively few quarrels take their origin in drink.

I believe that ten per cent. would be much above the proportion of crimes of all sorts, directly or remotely connected with the use of wine or spirituous liquors. During my residence in Greece, and my travels in it, I have scarcely seen half a dozen drunken men.

I am, sir, with great respect, obediently yours,

ROBERT P. KEEF,
U. S. Consul Piræus, Greece.

N. B.—The rakée in Greece is usually made from figs.

CADIZ, April 20, 1870.

DEAR SIR:—Your favor of the 23d of February last is received, and I will try to comply with your request as far as I know.

The chief intoxicating articles used in Cadiz and vicinity are:

cherry wine, burgundy and aguardiente; this last is the whiskey of Spain.

No crime whatever is committed on account of drunkenness; the Spaniards do not generally drink, and the only cases of intoxication belong to foreigners coming here as sailors, and to them alone is attributed all disturbance of peace. As far as I have been able to see, the intoxication leads those foreigners to quarrels and fighting, but nothing more, and permit me to inform you, that in my opinion either of the above liquids have on the inhabitants of this part of the country the effect to make them indolent; this, however, may come on account of the climate. No Spaniards carry on here any business of any importance, but, however, they are all in an easy social position. The people living in the country drink a good deal of aguardiente, which is the most dangerous of the above liquids mentioned. This aguardiente is of a white color, but not exactly, having a yellowish appearance, and its taste is very much like annisette. I have remarked often, as soon as these people have drunk sufficiently of this liquid, they were led to cheerfulness, and after to a complete state of indolence; but I never saw one in a state of intoxication. It is also the favorite drink of our sailors coming here. Now there are many robberies committed in the mountains, but the robberies and crimes which may be committed by brigands are committed in cool blood, as never or very seldom have they been found with any intoxicating liquid even in their camp. The health is generally very good, and in a population of 60 to 70,000 inhabitants, the daily average of deaths is three to four per day. Cherry wine and burgundy are the only wines shipped to the United States, of which the greatest part goes to New York, Philadelphia, New Orleans and Boston.

Very respectfully, yours,

A. N. DUFFIE, *United States Consul.*

UNITED STATES LEGATION, COPENHAGEN, }
2d May, 1870. }

DEAR SIR:—On the receipt of your favor of the 23d February, only a few days ago, I sought an interview with Mr. C. N. David, Chief of the Bureau of Statistics in Denmark, and one of the best authorities upon all such subjects in Europe.

I left with him a copy of your letter, and now enclose you his letter to me of the 30th April. As his statistics cover the period since the severance of the Duchies of Holstein and Schleswig, they may be taken as applicable to what is called "Denmark proper," and therefore, a population, I believe, of about 1,600,000.

In conversation with me, Mr. David deemed it extremely difficult, indeed impossible, to say what proportion of crime is caused by the use of intoxicating drinks. He only speaks certainly and confidently of suicide; but as to the general list of crimes, I take his impression to be that intoxication does not have here so marked an effect as it is generally supposed to have in the United States. Still he is very cautious to say that accuracy cannot even be approached on the subject.

He informs me that the quantity distilled, and the average consumption per head, are much greater than twenty or thirty years ago; but, with his accustomed caution, he adds that in making this statement, he speaks from official figures, and that the law affecting the manufacture being now stricter and better administered, he cannot say how far the estimate would be affected by former clandestine distillation, which is now very rare.

He assures me that while the average consumption has thus seemed to increase largely, the number of cases of manifest and public intoxication has greatly decreased; which he attributes partly to improved manners, morals and education, but mainly to improvement in the quantity and quality of food the people use, believing that well-fed people can support more alcoholic stimulus than poorly fed people.

He thinks the tendency and habit of intoxication somewhat greater in the cities than in the rural and agricultural districts.

In reference to retail sale in small quantities, there are two sorts of license: one to sell, with permission to use on the premises; and the other to sell, without such permission; and he thinks the permission to remain and use the liquor on the premises much more injurious to the purchasers. Practically there is no difficulty or impediment whatever in the way of those who want it, and are able to pay for it. He did not discuss prohibition at any length, but does not seem to regard it as an efficient remedy, and intimated an opinion that it would only increase the clandestine manufacture, sale and use.

Beer is very largely used here, as elsewhere in Northern Europe, but is not deemed an intoxicating beverage. It is said to be not nearly as strong as English beer, and I think is not so strong as that made in the United States.

The strong drink, or "brandy," is mainly distilled from barley; potatoes were formerly much used, but have been very little used since the appearance of the potato disease some years ago.

I cannot give any definite or intelligent opinion of the relative amount of intoxication here and in the United States, especially in

the N. E. States, where I have seen so little of the people. There is certainly much less visible and outbreaking intoxication here than in those parts of the United States where my opportunity for observation has been best; but on the other hand, I must admit my surprise at the large aggregate and average consumption shown by Mr. David's figures. The people of this country are remarkably quiet, steady, peaceful, plodding and law-abiding; given to much out-door and open-air congregation and amusement, but always with an order and decorum that have commanded my admiration. It is possible that owing to these manners, and to the climate, the same amount of intoxication would not be so much seen and heard here as where I live.

Very respectfully, your obedient servant,

GEO. H. YEAMAN.

COPENHAGEN, 30th April, 1870.

By returning the included letter of Mr. Bowditch of Massachusetts, I have the honor to communicate to your Excellency a notice concerning the produce of the home-distilleries in Denmark in the years 1864-1868, and the importation of brandy, or a kind of rum, from abroad, during the same five years.

Y E A R S .	Home Distilleries.	Exported.
1864-5,	34,753,000 pots.	1,498,000 pots.
1865-6,	35,794,000 "	735,000 "
1866-7,	33,071,000 "	1,045,000 "
1867-8,	31,614,000 "	1,141,000 "
1868-9,	32,632,000 "	864,000 "

Five pots are about 1 gallon. The home distilleries produced on an average 33,570,000 pots, or about 6,700,000 gallons, of which 1,257,000 pots (250,000 gallons) yearly are exported.

Y E A R S .	Importation of Brandy.	Re-exportation.
1864-5,	1,500,000 pots.	249,000 pots.
1865-6,	2,403,000 "	596,000 "
1866-7,	2,137,000 "	453,000 "
1867-8,	1,875,000 "	481,000 "
1868-9,	2,486,000 "	837,000 "

On an average, 2,080,000 pots of foreign brandy were imported (416,000 gallons), of which about 520,000 pots (104,000 gallons) were re-exported.

No doubt that this large consumption of intoxicating drinks in Denmark, as in other countries, has a very lamentable influence upon the moral and physical constitution of the people, though the state of the climate and the nourishment of the people, in accordance to its better condition and common welfare, to a certain degree, can mitigate this obnoxious influence; but it is in my opinion impossible definitely to ascertain the amount of crime and the deplorable effects on the health and prosperity of the people, which can be ascribed to the consumption of intoxicating drinks.

The sole fact, which I think in this respect can be quoted, is that among 100 self-murderers—and the number of self-murders is very large in Denmark,—according to the inquests of the coroners, 26.5 are declared “drunkards,” or “fallen into the abuse of drinking,” say for men 32.6, and for women, 8.7.

Your Excellency, most obedient,

C. N. DAVID.

To His Excellency, G.H. YEAMAN, *Minister of the United States.*

COPENHAGEN, 4th May, 1870.

DEAR SIR:—Since my letter of the 2d inst., it has occurred to me that the information was not so full upon the subject of *health* as you might have expected, but I do not find that I can make it much more explicit.

I have to-day sought an interview with Professor E. Fenger, formerly at once a leading medical practitioner in this city, a medical teacher in the university and in charge of one of the principal hospitals; and who has since devoted himself very much to all sorts of statistics, and is now acting as president of the principal life assurance company of this kingdom.

He agrees with Mr. David that there are very few reliable statistics on the subject, except in relation to suicide, which having been unusually and painfully frequent here, led to inquiries as to the causes.

He thinks that intoxication or excessive drinking often superinduces chronic diseases of the liver and kidneys, and at other times leads to dropsy and diseases of the bowels, but he does not think any accurate figures or proportions can be given.

He regards the consumption here as “very large,” and when I referred to the general opinion that it is much larger in Sweden and Norway than here, he replied that he believed the consumption

[illegible]

Regretting my inability to furnish you with fuller and more detailed information, I remain,

Very respectfully, your obedient servant,

GEO. H. YEAMAN.

COPENHAGEN, 5th May, 1870.

DEAR SIR:—I should perhaps make a correction in that part of my letter of yesterday relating to the lunatic asylum for Copenhagen. I used the expression "attributed to intoxication." In the printed tables the word "drik"—drink—only is used; and I cannot tell whether those who made the estimates and framed the tables of causes used this word to express the habit of drinking or the habit of intoxication. But as it is quite possible for a man habitually to drink too much without ever getting really drunk, they may have had in view only the habit of drinking too much.

I would add that the population of the city is about 170,000, and that but few cases are admitted into the asylum from other provinces.

Very respectfully, your obedient servant,

GEO. H. YEAMAN.

P. S.—In regard to the increased prosperity of the Danish people of which I have spoken, and of which there seems to be no doubt, it ought to be mentioned that several important facts have concurred with it, and, no doubt, have contributed to it.

Among these I would now only mention the improved condition of land tenure and distribution, as well as improved agriculture, greatly enlarged political franchise and improved educational facilities. There is, perhaps, no country in Europe, except Prussia, where the average standard of education and intelligence is so high as in Denmark—very nearly approaching in these two countries the standard attained in those States of the Union where the system of public common schools has been long established. I have said that agricultural laborers eat five times a day. The statement is true of the entire laboring population, except, perhaps, the household domestics of the upper classes. Well-to-do families have generally four meals, or two meals and two refreshments, which may be called in English, coffee, breakfast or lunch, dinner and tea. Even the inmates of the "poorhouse" eat five times a day, but are not furnished with the "brandy."

G. H. Y.

UNITED STATES CONSULAR AGENCY, }
COLOGNE, 8th July, 1870. }

DEAR SIR:—Your letter of the 23d February last has been duly received, and in reply I beg to express to you my sincerest regret that I have not succeeded in answering your questions in the way I wished to be able to do, although I endeavored to get information everywhere.

The chief intoxicating drinks used in this country are beer and brandy, and in the vine countries the most inferior descriptions of wine; however, it is particularly the brandy which produces the most disadvantageous influence on the health and prosperity of the people. From the inclosed communications, which the Board of Health of the Nether-Rhine at Dusseldorf has kindly given me on my application, you will learn that there are no official statistics existing in this country with regard to the amount of intoxication and of crime resulting therefrom, but it may be taken for granted that nearly seventy-five per cent. of the number of criminals have committed their crimes by the influence of intoxicating drinks.

I may still add that a correspondence has taken place on the matter between the said Board of Health and Dr. Varrentrapp of Frankfort-on-the-Main, who is an experienced man in the branch of prison matters, and that he was likewise unable to answer fully your questions, but being about to send some books to Boston he promised to add some pamphlets referring to the matter for you, which I have every reason to believe he will have done.

I remain, very respectfully, yours,

GEORGE HÖLSCHER, *U. S. Consular Agent.*

Mr. Hölscher subsequently forwarded the following documents:—

(TRANSLATIONS.)

SIR:—Allow me to answer your very kind letter of the 20th of this month. The question raised in the royal ministry in regard to statistics concerning “what influence the use of intoxicating drinks had on the number of committed crimes,” was not taken into consideration particularly, and other official statistical statements for judging this question are unknown.

The Chief Procurator, (Signed,) BÖLLING.

COLOGNE, April 27, 1870.

COLOGNE, May 13, 1870.

SIR:—I have the honor to answer your very kind letter of the 6th, and regret very much that I am unable to answer your inquiry in regard to the statistical information of “what influence the use

of intoxicating liquor has on crimes," and can furnish you no materials. It is generally known what a powerful influence it exercises, and for this in particular all institutions for correction are in the same position. To prove facts in different ways with the multitude of examples there are, so far as I know, no statistical proofs, and if there are such in existence, they are to be regarded only as not even approaching the truth; the difficulty in presenting them does not need any further explanation. So far as regards the institutions of punishment, I am unable to give you any statistical information, though for the last twenty years I have spent my time in works of statistics, particularly in relation to improvement in institutions of prisons very minutely.

The Director, VON GOTZEN.

To the Superintendent of the Society }
of Public Health, Dr. Lent. }

COLOGNE.

DR. LENT:—You honor me with your letter of May 17th, referring to the letter of our Agent, Pastor Schiffer, of May 7th. Allow me to answer.

All the gentlemen connected with the Institutions of Punishment, the Directors, Inspectors of our provinces, to whom we addressed ourselves—namely, the President of the State Commission of Health of the United Provinces, for the purpose of finding out what influence the use of intoxicating liquor has in the amount of crimes in this country, answer as follows:

Proper statistical material was not communicated, and is very difficult according to the nature of the matter, because in many institutions the personal acts of the imprisoned are not brought forward, and the experience of a few does not give sufficient standpoint to make statistical results.

We have the honor to collect the information of single institutions.

The Director of the Institution for Correction at Herfordt, communicates that in the House of Correction, in the Province of Westphalia, where there are the most Protestant prisoners, minute statistical notices are not extant. It would come very near the truth to say, that seventy-five per cent. of the crimes of prisoners, particularly murder, manslaughter, resistance against authority, criminals against morality, assault and battery, thieving, house-breaking, and even a higher percentage of some of these crimes can be traced to intoxicating drink. In Munster a great penitentiary, where there are from 600 to 700 Catholic prisoners, only since February when the new Director came, have they begun to collect such notes. For this an answer is not possible.

The Director of the Central Institution at Hamm, A. L., where there are from 400 to 500 prisoners, communicates the fact that two-fifths of the cases of assault and battery were due to the influence of liquor. The Inspector of the prison on the Spaumberg, near Bielefeld, where the prisoners aggregate 70 or 80 per day from the district Minten, says one-third are punished for stealing, one-sixth for heavy assault and battery, one-sixth vagabonds, one-sixth for loafing and insulting, and the last one-sixth for depredations. With the exception of youthful thieves, the use of intoxicating drink was the direct or indirect cause of nearly all this crime. The Director of the House of Correction at Benninghausen, answers that he has no statistical material; still the report of the Director of Brauweiler and our own experience show, that without exception beggars and vagabonds come in this way.

We observe still, that besides the above named Institutions, there are a great number of prisoners whose time is three months.

Regarding the Rhenish Provinces, we did not receive any information from the Director at Werden, he having been there only two months.

The Superintendents at Dusseldorf, Cleve, Bonn, and Coblenz, regret not to be able to give any satisfaction.

The Director of the Cologne Institution answered that he sent you his report as asked. The Director of the House of Arrest, in Aachen, estimates according to his experience, the number of persons made criminals in consequence of intoxicating liquor, at 75 per cent.

From the report of the Inspector of the House of Arrest, whose daily statements are about 200 prisoners, it is found that 75 per cent. of the imprisoned became criminals by brandy. Not only grown persons, but youths and even the female sex, are not excluded from it. Young persons from seventeen to eighteen years of age, and old men after being dismissed, are brought in again for new crimes, entirely drunk on the next day.

On dismissal the prisoners are *saluted*, partly by their parents, partly by their male and female friends, with a bottle of schnapps at the very gate of the Institution. Of those who have been deprived of their liberty, and present themselves for punishment, hardly one is sober, and almost daily, because entirely drunk, they are sent off again. The excuse, "Yes, he is a very good fellow, but he likes to drink," parents do not hesitate to say of their children of tender years.

The Director of the Institution for Correction at Tsier, where prisoners are retained one-quarter in the House of Correction, and

three-quarters in jails, reports that of 1,091 prisoners for 1869, brought in to undergo punishment, 380 were punished for assault and battery, indecent exposure, destroying property, and as nuisances in the street. Beer and brandy are not much drank; on the contrary *very* much cheap wine, or cider called “tietz” is used, just as much intoxicating as any other intoxicating drink.

Among the 70 prisoners in the House of Correction, there are found 51 criminals among old men, seventy to eighty years of age, punished for lewdness, many of them with small children. Even here the excessive use of intoxicating liquor can, with certainty, be regarded as the cause of this crime.

SIR:—In response to your kind letter of the 14th of this month, I have the honor to say, that I am not in the position to furnish you with statistical notices on the question of “what influence does the use of intoxicating drinks have in the number of crimes in this district?” There is no doubt, that the excessive use of spirituous drinks, particularly schnapps, in one word, drunkenness is the cause of the imprisonment of the greatest part of the inhabitants of the institutions for males in this place.

A great number have by the excessive use of schnapps, been broken down morally, so far that they ignore entirely the duty imposed by the Creator on every man, to earn his living by work, and they prefer rather to be beggars and vagabonds.

Another part, among whom I count mechanics, are ruined in consequence of this vice, so far that they are no longer able to fulfil the moderate expectations of the trade. Such individuals are found regularly on the travel, but they do not have the will to accept work, but go about begging, to satisfy their appetite for drink. They succumb to the law.

Again, there are others, who by excessive use of schnapps, are not able to perform even the lightest kind of work. Homeless, they are loafing about, and at last for want of support they are imprisoned and punished.

To this class also belong fathers of families, who do not use their daily wages for the support of their families, but spend them for schnapps, and let their families suffer. According to law they are subjects for imprisonment, and liable to be sentenced.

I repeat that schnapps in most cases is the cause of vagabonds beggars, and being without homes. How much the vice of drunkenness can captivate a man, in other words stick to him, can be proved by the fact, that most persons imprisoned here, have nothing else to do, as soon as they are set free, than to quickly find a *rum-hole*, and

with a real rapacity fall upon this devilish drink, after having been deprived for months, and even years.

I am convinced that a great number of prisoners, if they have opportunity, would rather stretch out their hands for a glass of schnapps than a piece of coal.

The above sad descriptions are not all based on exaggerations, but they rest on my many years' experience, and are an imperfect picture of the naked reality.

With high esteem, yours,

MÜLLER, *Director*.

BRAUWEILER, May 25th, 1870.

We declare ourselves ready to contribute in the future, as far as possible further explanations on this point of law, and of society, which makes our work so difficult.

We sign with the highest esteem. The Committee of the Society of Prisons of Rhenish Westphalia,

(Signed,)

SCHEFFER.

DUSSELDORF, June 23d, 1870.

DUBLIN, May 6, 1870.

DEAR DR. BOWDITCH:—Your letter dated March 8, was duly received, and the very day it reached me I placed your questions in the hands of Mr. Russell, the agent of the Irish Permissive Bill Association, a man of great zeal and ability, and who is, I think, better qualified to answer your inquiries than any one else I know of. He travels extensively through the country, and is a person of great intelligence. He promised, and I believe intended to reply very soon; but I suppose his numerous engagements prevented his doing so. I will keep him in mind, and will let you know as soon as I possibly can.

Yours, with great regard,

RICHARD D. WEBB.

The following is the reply of Mr. Russell, since received:—

Query No. 1.—"What are the chief intoxicating articles used in Ireland?" Amongst the poor and middle classes, whiskey and porter. Amongst the rich, wines and brandy.

It has been found of recent years that ether has been used to a very considerable extent in several northern towns, notably in Draperstown and Maghera.

Query No. 2.—"What amount of crime is produced by them, and their effects on health and prosperity of the people?"

In 1868, the last year for which I have “judicial statistics,” 76,000, men and women, were charged before the magistrates throughout the country on the ground of drunkenness, Dublin, with a population of 250,000, contributing 16,000.

With the exception of the class of crime known as agrarian, near the whole crime of Ireland is due to drink.

TESTIMONIES ON THIS HEAD.

“The cases which will come before you originated entirely in the indulgence of intoxicating drinks. If our poor people in this country were free from this vice, not a single case would come before you at these assizes. We have in Ireland less crime than in other countries; but it would be still further diminished if the indulgence in intoxicating drink was completely stopped, or at least far less practised than at present.”—*Mr. Justice O’Hagan (now Lord-Chancellor) to grand jury at Monaghan, 1868.*

“Our experience leads us to the conclusion that all the crimes we meet with on circuit are more or less, directly or indirectly, caused by drunkenness.”—*Mr. Justice Lanson to grand jury at Armagh, 1869.*

“I have been thirty years chairman of quarter sessions in several counties in Ireland. I have, perhaps, presided at more criminal trials than most men living, and I can truly say that I have had scarcely a case before me with reference to the class of offences known as against the person that was not the consequence of drunkenness.”—*Mr. M. O’Shaughnessy, Q. C., Chairman of Quarter Sessions, County Clare.*

The effects of drinking upon the prosperity of the people may be gauged by the following statistics. The consumption of drink has rather increased since 1865, but the figures given are all under the mark rather than above:—

Consumption and Cost of Liquor in Ireland, 1865.

Home-made spirits retained for consumption (gallons),	5,036,814
Foreign and Colonial,	“ 325,995
Wines of all sorts,	“ 1,208,233
Beer, (barrels),	1,538,209

Cost.

Home-made spirits, at 16s. per gallon,	£4,029,451
Foreign and Colonial, at 20s. per gallon,	325,995
Wines, at 15s. per gallon,	906,174
Beer, at 37s. per barrel,	2,840,137

£8,102,757

This expenditure, in proportion to the population, is greatly below that of either England or Scotland, but still it is enormous, being

at the rate of £1 9s. for each individual, or nearly £7 10s. for each family in the country.

It is £2,043,477 more than the value of the entire imports into Ireland, that being in 1865 £6,059,280

It is £1,318,217 more than the total revenue of Ireland, that being in 1865 6,784,540

It is nearly five times as much as the total receipts of the railroads in Ireland, that being in 1865 . . . 1,737,061

It is nearly eight times as much as the whole county cess of Ireland, that being in 1865 1,061,399

It is more than ten times as great as the entire sum voted by parliament for primary education, that being in 1865 336,770

And were these added together, the whole receipt of the railways, county cess, entire sums expended on poor relief and primary education, it would not amount to one-half of the sum expended on intoxicating liquors.

Sum expended on intoxicating liquors,	£8,102,757
Receipts of railroads,	£1,737,061
Grand Jury cess,	1,061,399
Poor rate,	731,851
Education grant,	326,770
	<hr/>
	3,857,081

Balance, £4,545,676

The poverty of the country is thus intensified by the drinking habits of the people.

I am not in a position to say what the results are upon the health of the people generally. But medical men are clear in their testimony that a very large percentage of the disease brought under their notice arises from drink.

T. W. RUSSELL.

ELSINORE, DENMARK, 3d May, 1870.

SIR:—I have the honor to acknowledge the receipt of your circular letter of the 23d February, making inquiries as to the influence of intoxicating drinks on the health and prosperity of the people of this country; and in reply to the several questions contained therein, I now beg to inform you.

1st. That the principal intoxicating drinks used in this country by the middle and lower classes of the population are beer and spirits

distilled from barley and rye, under the denomination of corn brandy. Under this head, I give you the statistics of the quantities annually consumed, as far as I have been enabled to collect them. They are as follows :—

Of home manufactured spirits (corn brandy), about 6,500,000 gallons.

Imported spirits,	. . . . .	450,000	“
Wines,	. . . . .	400,000	“

Of the exact quantity of beer consumed, I am sorry to say I have not been able to obtain any correct and positive returns, no duties or excise being levied on this article. From the information which, however, I have been able to get from intelligent brewers and others, I think it can safely be put down as at least twenty gallons annually for each head of the population. The principal brewer in this town has given me the amount brewed here and sold for consumption by the population of this town and the neighboring land districts; to say a population of about 12,000, and the quantity of beer sold about 275,000 gallons, and this would appear to confirm the calculation above mentioned of twenty gallons per head.

It must, at the same time, be borne in mind that the great part of the beer consumed is very thin and weak, as the prices will show, beer being sold here at prices varying from one to four cents per bottle.

Denmark has a population of about 1,600,000 inhabitants, which will give a consumption of about four and a half gallons of wines and spirits per head, and this added to the amount of beer consumed, will, in my opinion, give a heavy average amount of consumption as compared with other countries.

Strange to say, this large annual consumption does not seem to have any injurious effects on the health of the people. The Danes are a remarkably strong and hardy race, and the average duration of life will bear a favorable comparison with any country in Europe and is certainly superior to that of the United States. There is much less energy of character to be observed amongst the people generally here as compared with us, but whether this is to be attributed to effect of climate, or to the too great use of intoxicating drinks, I am not in a position to say. During my short stay in this country, I have been much struck with the general sluggishness and small amount of work obtained out of the laboring classes as compared with the same classes in the States, and I have been a frequent witness to the strange sights of ship carpenters, masons, house carpenters and other trades, knocking off in their work to take a drink out of their bottles of beer or spirits.

Cognizant as I have been of the large quantities of these drinks generally consumed here, I have been considerably surprised at the exceptional cases of intoxicated people I have seen, either in the streets of this town or in my frequent visits to Copenhagen, the capital of the country, and I have no hesitation in saying that I have witnessed a much greater amount of intoxication in the towns in the United States than I have in this country.

2d. As regards the amount of crime produced by the use of these drinks, I cannot find any statistical tables to supply me with such information, but I am told by the police magistrate of this town, that in his jurisdiction no cases of murder, homicide, or theft, that have ever been brought before him, could be traced to the influence of drink, and that even arrests for street disorders are very rare amongst the inhabitants, and chiefly confined to the foreign seamen frequenting the place.

As far as my own personal observations go, the Danes seem to be a remarkably peaceable and orderly people. There is no rowdiness to be seen in the towns, and the very few intoxicated people I have seen in the streets, seem to stagger along without making any attempt to molest the passers by. The very low prices of these articles in this country, say ten cents for a bottle of corn brandy, and one to two cents for a bottle of ordinary beer, accounts, doubtless, in a great measure for the small amount of poverty which might be expected from so large a consumption of intoxicating drinks.

I have the honor to be, your most obedient servant,

C. C. SHEATS, *U. S. Consul.*

CONSULATE-GENERAL OF THE UNITED STATES, }
FRANKFORT-ON-THE-MAIN, May 20, 1870. }

DEAR SIR:—I have the honor to acknowledge the receipt of your circular, dated February 23d, 1870, and now transmit a reply to the same.

I incorporate herewith, as a part of this reply, a communication upon the subject made to me by the vice-consul, at this consulate, who has resided in this vicinity nearly the whole of a long life, and who is very competent in every respect, being himself a German, to give an accurate history of the uses of drinks in Germany.

To your first inquiry: What are the chief intoxicating articles used in Frankfort and vicinity?

I answer,—wines, beer and cider. French brandies are used in very small quantities by some, but very rarely by native Germans. The qualities of wines used depend upon the rank, condition, means

and associations of the individual. The wealthiest classes use champagne in free quantities, sparkling Hock, the best Rhine wines, and the purest and richest Bordeaux wines. The middle classes use champagne and hock in small quantities, but generally drink light and cheap pure Rhine wines, and Bordeaux wines of a cheaper kind, and certain kinds of beer called "vien" and "Bairisch" beer. The poorer classes use a brandy made of potatoes, cheap and poor beer, costing about one-half as much as the beer known as "vien" or "Bairisch," and cider, all of which is drunk very largely. Water is not much drunk. To your second inquiry, "What amount of crime is produced by them? and their effects on health and prosperity of the people," I answer, that it is impossible to find any statistics of crime which go so far as to inform of the causes of crimes. Observation alone can enable any one to form an opinion of the proportion of crimes caused by the use of intoxicating drinks. I believe that but very little crime is committed in this part of Germany. There are few high crimes committed. An ordinary assault is very rare. Larceny is the most common offence. The surveillance of the police is searching and ever alert. People are restrained from the commission of crime by the fear of punishment, which is most certain to follow. Intoxication is very rare. During a residence of a year in Frankfort I have not seen more than five persons intoxicated. All of them were of the lowest order of laborers, and still not quarrelsome, but very hilarious and good-natured. I have seen no one stupidly drunk or as we say "dead drunk." I have seen no well-dressed person, nor any person claiming to be of a respectable condition or having any business or calling, whom I supposed to be under the influence of intoxicating liquor, in a noticeable degree.

Either from climate, temperament, mode of life, habits, or from necessity, the German seems to be of a quiet character. I can hardly say contented, nor happy, nor much more of a prosperous character. Originally, from the necessity of a common defence, they congregated into small, compact and ill-ventilated and badly planned and constructed villages; and now from choice they continue in the same old villages, instead of scattering along the lines of the highways; and from them every morning sally out the men and women (and more women than men) to labor in the adjoining fields, or to work in the near cities, spending the day upon a pittance of bread, and return at night into their village at dark to enjoy the only meal of the day, and to spend their evenings in smoking and drinking their beer in crowds or cliques.

The lot of the German laborer seems to be hard. He travels

miles to his daily work, he works hard, he fares most scantily, he receives very small pay for his labor, he returns at night tired, worn, weary, and in his house he finds no comfort, and yet he does not resort to intoxication for a relief from pressing sorrow or despair. He rises again, eager to go through the same routine. He commits no crime. He thinks of no evil. He expects to labor, and looks to nothing more, and for nothing more. He seldom complains, whatever may be his suffering. He receives but little, he subsists on little. His expectations are not great, and are cheaply and easily gratified.

They seem to be healthy, both the men and women. The women will do as much labor in the field as the men, and perform the same labor as the men.

I cannot say that the drinks now in common use add to or in any way contribute to the health and prosperity of the people of Germany. Neither can I say that the common drinks, such as beer and cider, seem to be injurious to the health.

If some kind of drink, beyond water, is to be used, the milder, the weaker, and the purer the drink the better. If coffee can be made satisfactory, it would seem to be the best drink. And I believe that the common hourly use of it in Germany keeps out of use a mass of intoxicating drinks.

I will add that the use of fancy mixed drinks is not known here. There is no standing at the bar to drink, and no bars to attract. You will thus see that the amount of intoxication in this country is much less than in the United States. I attribute the fact to the different kinds of intoxicating drinks in common use, and to the different ways in which those drinks are used.

In the city of Frankfort, with a population of one hundred thousand persons, intoxication is rare. Crime is rare. The health of the people is good. As a whole the people are prosperous. The habits of the people contribute greatly, if they do not wholly produce this state of things.

I take the liberty to send to you herewith certain statistical information in the inclosed pamphlet, which you may be able to peruse. I can find no similar information in any other form.

I have the honor to be, your obedient servant,

W. PRENTISS WEBSTER, *U. S. Consul-General.*

STATEMENT OF VICE-CONSUL.

The chief intoxicating article used in Frankfort and vicinity is the common brandy distilled from potatoes. Twenty years ago the city and country were full of dram-shops, which, owing to the im-

provement of the beer and the introduction of coffee amongst the laboring class, have nearly entirely disappeared. At that time the out-door mechanic, such as carpenters, masons, and those employed in factories, who live out of town, had merely one warm meal, which was the supper. Their breakfast, dinner and vesper consisted then of brown rye-bread, some home-made cheese, and common brandy. The latter was then taken in large quantities, and they became gradually drunkards and ended in misery.

The field laborers, men as well as women, employed upon the farms, come in the spring from the mountains, very sterile parts, where, during the winter, the men are employed as wood-cutters, and the women spin, and live mostly upon what they have earned during the summer as farm laborers. They receive there regular meals, dinner and supper, and generally two pounds of rye-bread, and a half bottle of common brandy.

It has been in vain tried to give them, instead of the brandy, the money therefor; but they prefer (men and women) to take their ration of brandy, which after awhile proves not to be sufficient for them, and they spend for more their hard-earned money. Most of the drunkards now seen consist of this class of people, whose winter habits in the mountains follow them to the fields and to the city.

The middle classes of the people of this part of Germany drank heretofore, as a beverage, cider, principally in the evening, often to excess. As cider, drank in large quantities, produces generally sourness of the stomach, they added, in the belief of remedying this, a glass or more of brandy, and many became in that way drunkards.

The better class, and all able to pay therefor, drank generally light wines, and there were but few drunkards among them.

Such was the state twenty years ago. By the improvements in making better beer, things have been changed. The drunkards have disappeared. A great deal less of cider and wine is consumed. The people now generally drink beer. Many drink to excess even now. Intoxication has decreased.

Now, owing to the fact that in the German army coffee in the morning has been introduced, the young men get accustomed thereto. At noon they now cook themselves coffee instead of drinking, as heretofore, brandy with their bread. They drink now also in the afternoon coffee or beer. So that now they consume little or no brandy. The field laborers, men as well as women, continue, however, to drink brandy, notwithstanding that in the morning on many farms they now receive coffee.

The laws of Prussia do not allow intoxication as a plea in the defence for crimes. It is left to the judges to take accidental intoxication into consideration. No statistics are therefore kept as to the causes of crime. Intoxication continually occurs, not habitual, and not causing crime; but it is more accidental, from over hilarity in drinking.

It cannot be said that the general health of the people has suffered or suffers in this part of Germany. In the city of Frankfort, with a population of one hundred thousand persons and an average annual mortality of fifteen hundred persons, hardly an average of five persons have died of delirium tremens.

As a general fact in Germany, in those parts where wine grows and where the chief beverage is beer, there, intoxication is less and has been decreasing.

The contrary is the case where there are large distilleries, and more ardent spirits are consumed.

It cannot be said that the prosperity of the people has suffered. If it has not increased in equal rate with other countries, it is more in consequence of the increased extravagance in the luxury of dress among the females, and the passion of hunting after pleasure. During the winter, not only all the beer-houses, but all other places of amusement are now filled. In summer, public gardens and excursion-trips and the amusements of the Sunday generally use up the earnings of the week. Very few of the common people lay up money.

FLORENCE, May 20, 1870.

SIR:—I have received your circular of February 23, 1870, asking information in regard to the use and effects of intoxicating drinks in Italy, and I proceed to reply.

The intoxicating drinks consumed in Italy are,—*First*. The native wines of the country, which are abundant and very various in quality. In general the Italian wines are not so light as those of western France, nor are they, though often excellent, so carefully or so skilfully prepared. As in other wine-producing countries, the wines designed for sale are largely adulterated, and the better qualities extensively counterfeited, so that pure wine is scarcely to be had except directly from the producers. As a general rule, Italian hotel keepers in the large towns furnish only such native wines as it is impossible to drink, in order to compel their customers to order foreign wines on which they make a larger profit, and of course travellers, who judge Italian wines by those they take at hotel tables, can form no just opinion of their quality.

Secondly. Foreign wines, imported chiefly from France, and in smaller proportion from the valley of the Rhine, from Austria, including Hungary, from Spain, Portugal and Greece. The foreign wines are used principally by foreigners travelling or residing in Italy, but wealthy Italians consume a good deal of French wine, and the products of the Austrian and Hungarian vineyards, introduced into Venetia and Lombardy during the Austrian rule, have acquired a certain favor in those provinces, and are still imported and used by the inhabitants to a considerable extent. The native Lombard and Venetian wines are generally of inferior quality, and this circumstance also encourages the importation of those of northern growth in preference to the less carefully prepared wines of Southern Italy, to which the taste of the people of the newly acquired territory is not yet accustomed.

Thirdly. Spirituous liquors, generally of inferior quality, distilled in the country, and a certain amount of French brandy, Holland gin, and American and Scotch whiskey and rum, a considerable part of all which is used as the basis of different liquors and cordials. The employment of distilled spirits as a beverage, except as an ingredient in cordials which are taken in very small quantities, and as a zest for coffee, is recent in Italy, and is due principally to the diminished quantity and increased price of wine, in consequence of the prevalence of the grape disease.

Fourthly. The same cause has greatly increased the consumption of beer which is both manufactured in Italy, and imported from the German States. The malt liquors preferred by the Italians are mild, and as their table does not tempt them to excess in these beverages, it is perhaps hardly just to class such liquors among the intoxicating drinks consumed in Italy.

I am not aware of the existence of any trustworthy statistical information in regard to the amount of crime produced by intoxicating drinks in this country, but, if one can trust the police reports, the excitement of intoxication is the source of a by no means inconsiderable proportion of the offences which are brought to the notice of the public authorities.

So far as my observation extends, I should judge that the breaches of the peace and other violences traceable directly to intoxication, are much more frequently due to the use of ordinary distilled liquors and of absinthe and other like detestable mixtures, than to that of wine.

Wine is used in Italy as a beverage for quenching thirst, or as an accompaniment of solid food, and but rarely for the sake of its action as an excitant. It is the habitual every-day drink of the

people, from a very early age, and it does not, when taken in the moderate quantity which satisfies a common Italian appetite, seem to produce the same stimulating effect upon their constitutions as upon those of nations less accustomed to it.

The educated and refined classes make very little use of distilled liquors, domestic or foreign, and they seldom indulge freely even in wine, though it is always within the reach of every one, except the poorest. Intoxication is therefore extremely rare among persons of even no more than average culture, and it scarcely occurs except among the badly fed, badly clothed and badly sheltered, who have too often become previously debased by indulgence in other vices. In short, intemperance is not so prevalent in Italy as to rank among the great social evils which force themselves upon the attention of the criminal legislator, the public economist and the philanthropist alike, and the subject has but little of that terrible importance which attaches to it in the United States and the British Empire.

I have no doubt that this remark is equally applicable to most—I am sorry I cannot say all—wine-producing countries, and I am inclined to the opinion that an abundant supply of cheap, light wines would tend, in the long run, to diminish rather than increase intemperance in the United States.

But this is a question upon which I cannot venture to pronounce confidently, without fuller information than I possess and more mature consideration than I have been able to bestow upon it. The climatic and other physical conditions of the United States, not to speak of long established habits among the people, are so different from those of European vine-growing countries, that we must use much circumspection in reasoning from one to the other. Aside from the mere gratification of the palate, the habit of smoking—for the Italian is guiltless of the filthiness of chewing—tobacco, is almost the only provocative of intemperance which is common to the people of the United States and those of Italy. Each country has its special temptations and incentives to this vice, but in Italy they are more easily resisted, the habit of indulgence in stimulants is more readily conquered, and there is no possibility of doubt that intemperance is both a vastly more common and a more destructive vice in the United States than in the European countries situated between the same parallels.

From the effect of a cold winter climate and a more abundant supply, the American consumes habitually a very much larger proportion of animal food than the inhabitant of Southern Europe, and this he seasons with a much greater quantity of salt and other thirst-excit-

ing condiments; the frosty air, which he inhales with every breath for a large part of the year, smites his vitals with a chill which seems to demand a fiery fluid for its expulsion, and when the short season of agricultural toil returns, he uses more muscular effort, and that too during the hottest months of the year and the hottest hours of the day. These circumstances create in the American a chronic appetite for drink which is not easily assuaged by "thin potations," and he craves, if he does not actually need, beverages rather strongly *accentuated* in their appeals to the palate.

It is certainly not probable that persons long habituated to the use of distilled liquors would readily abandon them for the milder wines, or indeed for any fermented drink however generous, and cases would no doubt occur, where persons previously altogether abstemious would be seduced into excess by the temptation of a cheap and agreeable drink, the intoxicating properties of which might be as questionable, or at least as stoutly disputed as those of lager beer, but it is to be hoped that the use of light wines, especially at meals, would prevent the formation of habits of indulgence in stronger beverages by thousands who are now ruined in mind, body and estate by intemperance.

I am, sir, respectfully yours,

GEORGE P. MARSH.

FAYAL, AZORES, 15th May, 1870.

SIR:—Your favor of 23d February, via Lisbon, only reached me on the 28th ult. I regret that I cannot give you any information worthy of your notice, in regard to the very important and interesting subject on which you wrote.

Until the almost entire destruction of the vines in 1855, comparatively little spirit was consumed in these islands, the common wine of the country, which was freely used, costing only from eight (8) to ten (10) cents per gallon. At present, wine is quite expensive and rum has taken its place, but I cannot say that there has been any marked increase of intoxication. These people, like all the Latin races, I believe, are far more temperate than the Anglo-Saxons, and there is *very much* less intoxication here than in the United States. No statistics are to be had of the amount of intoxication and crime resulting therefrom, but the islanders (of the westernmost islands especially) are a quiet, inoffensive people and crime is very rare. I sincerely wish that I could have been the means of throwing more light on the important inquiries you are making, and remain,

Yours respectfully,

JOHN P. DABNEY.

GENEVA, May 2, 1870.

DEAR SIR:—In reply to your questions, 1st, what are the chief intoxicating drinks used in Geneva and vicinity? and, 2d, what amount of crime is produced by them and their effects on health and prosperity of the people?

I answer to the 1st, the most deleterious intoxicating drink used here is *absinthe*, which is a strong and generally mean *eau-de-vie* flavored with wormwood (not brandy, for this is called *cognac* or *champagne fin*), made of the must of poor grapes, or perhaps of potatoes, and paralleled in our country by that pine-top whiskey or apple brandy, which “are warranted to kill at forty rods;” next to this is a mean white wine, which taken in excess, destroys the digestive organs. If, which is rare, one of the better class of men is given over to the disease of intemperance his career is generally ended with absinthe. For the poor, the destroyer of health and promoter of quarrels is the aforesaid white wine.

An experience of several years has satisfied me that there is far less intoxication, and crime as its resultant, among the Swiss than with us. A stranger would be deceived as to this by noting the multitude of *cafés*, which answer to our saloons or restaurants, and the crowds which frequent them; but an attentive observer will note that rarely is any one seen to leave the better class of *cafés* the worse for what he has drank—which is coffee or beer or wine or a small cordial glass of brandy with a lump of sugar—but he will also be surprised to find so much quiet in a large crowd when there are persons engaged with newspapers or playing chess or cards or billiards, or in earnest conversation around tables where half a dozen may gather, and all furnished with the means of exhilaration. The truth is wine, *vin ordinaire*, or the wine of the country (known among us as claret) is the daily drink of every family whose circumstances will permit it, and this includes all but the very poor. This wine is less exhilarating than our cider and more healthy, and to this, and the quiet lives of the people, may be attributed the absence of drunkenness, for it is not common to see a staggering drunkard in the streets here.

I have never seen any statistics of crime in Switzerland.

The prosperity of this people would be increased by a diminution of the number of *cafés* where they waste their time rather than their health.

Very respectfully, your obedient servant,

CHAS. H. UPTON, *U. S. Consul.*

LEIPSIK, May 4, 1870.

DEAR SIR:—Your favor of February 23, making inquiries concerning the chief intoxicating articles used in Leipsic, and the amount of crimes produced by them, has been received. In reply I have the honor to give you a few, only approximately correct, statistics relative to these inquiries.

The chief intoxicating articles used in Leipsic are *beer* and *wine*. Comparatively little whiskey or rum is consumed as beverages. Among a population of about 95,000 inhabitants (independent of the large floating population during the three annual fairs), there are annually consumed in Leipsic about 400,000 gallons of beer and 150,000 gallons of wine.

The number of arrests made by the police during the month of April was 506, of which number were 42 for drunkenness. This, according to my recollection, is a fair average of the arrests made during every month of the year, so that among the annual arrests of 6,072 persons, 504, or nearly eight per cent. of those arrested, are arrested for drunkenness, or a little more than one-half per cent. of the entire population. That drunkenness occurs unknown to the police I freely admit, but, I believe, so far as my observation goes, not half as much as in American cities of a like number of inhabitants.

As to what amount of crime is produced by the use of beer and wine I have no data according to which I might make my calculations. But so far as the publicity of these crimes is concerned the percentage, according to my observation, is comparatively small.

As to the influence of these drinks upon the health and prosperity of the people I have no means of judging except my own observation. I cannot say that either my own observation or the opinion of physicians teaches me that a moderate use of these drinks acts in a deteriorating manner upon the health of the public; for, according to the testimony of physicians, the general health of the public is good. Of course there are always exceptions, and perhaps many.

As to the influence of these drinks upon the prosperity of the public I have no data except my own observation. Considering, *first*, the comparatively low wages of the laboring classes; and, *second*, the universal practice of smoking cigars, independent of, and during, the drinking of these beverages, I cannot but believe that both these practices consume a comparatively large amount of the weekly wages of the laboring classes, thus reducing their home comforts to the lowest possible degree, and producing in many cases an actual want of the necessaries of life.

I have given you, without fear or favor my opinion, based upon

my observation, concerning the amount and influence of intoxicating drinks consumed in Leipsic. Of course in some particulars I may be, for ought I know, wrong.

Very respectfully yours,

M. J. CRAMER, *U. S. Consul.*

UNITED STATES CONSULATE, TOWER BUILDING, SOUTH WATER ST., }
LIVERPOOL, June 13, 1870. }

GENTLEMEN:—Your letter making inquiry about the influence of intoxicating drinks upon the people of Liverpool and England was duly received. Not having the requisite information myself to make a correct and proper report upon the subject, or the time to spare from my official duties to obtain the facts, I referred your letter to an esteemed friend, not only competent but reliable, to obtain them for me. I now have much pleasure in enclosing to you Mr. Patterson's report. His knowledge of the subject and his character and standing as a man are a sufficient guarantee for what he says, and if more were necessary I might add that my residence for more than eight years in the country confirms me in the belief that he is not in the least overstated or exaggerated the truth.

I am, sir, very respectfully, your obedient servant,

THOMAS H. DUDLEY.

LIVERPOOL, May 27, 1870.

THOMAS H. DUDLEY, Esq., *U. S. Consulate, Liverpool.*

MY DEAR SIR:—In acknowledging receipt of your note and replying to your inquiry as to the influence of intoxicating drinks upon the well-being of our population, I have judged it advisable to accompany my remarks by two documents, bearing upon the question in its moral and physical aspects.

The first is the report and abstract of evidence upon intemperance of a committee of convocation of the province of Canterbury, being the highest ecclesiastical authority of the Established Church, and they, after an exhaustive examination, concur with the opinions heretofore expressed by Presbyterians, Methodists, Baptists and others as regards the evils inflicted upon the people by the excessive use or abuse of intoxicating drinks, whilst they attribute the prevalence of this vicious abuse largely to the facilities for obtaining the same, and that, in the cases where landed proprietors have prevented the opening of drinking-houses upon their property, great blessings have resulted in the peace and sobriety of such parishes.

The second document is one of a more local character. The coin-

cidence of an excessive death-rate in Liverpool with an increase of public-houses led to much discussion, and the policy of the magistrates in opening the trade to all comers with suitable houses against whom no bad characters could be proven was impeached, not because it shut the door against favoritism, which was a good thing but because its (impartial) operation added to the numbers of a trade already excessive in the town. This led the town council to an examination, and I may remark that so far as I know no teetotaler had a place, as none has at present, upon the magisterial bench or the town council, whilst upon the latter body the liquor traffic has a powerful representation, and a brewer and owner of a large number of public-houses was a member of the sub-committee of the health committee of the town council, appointed to inquire into the mortality of the town. Their report, page ix, assigns to intemperance the foremost place as a cause of increased death-rate, and in my humble opinion rightly.

There is a topic upon which I am, perhaps, not competent to enlarge, nor can I readily refer to printed evidence beyond margin, but which I would venture to indicate as deserving of attention, namely, the increase of drunkenness amongst women. Our respected stipendiary (police) magistrate has, in my hearing, remarked upon it as one of the saddest features of our black record in Liverpool. It can hardly be doubted that the increase of beer-houses has, by carrying drink to nearly every corner, largely contributed thereto.

Another point deserving more investigation than I can give to it is how far incautious alcoholic medication may contribute to the increase and perpetuation of drunkenness. It is only by the medical profession such can be explored and remedied, but there is a growing feeling amongst social reformers (in which I share) that not only are nurses and other officials in our hospitals, &c., exposed to demoralization from the quantities of alcoholic drinks passing through their hands or under their care for supposed medical uses, but that in many cases a taste for the article may be formed or (more frequently) revived by the administration of liquor in a palatable form, and, however valuable as a medicine, it appears needful that more care should be taken in its exhibition. The remedies suggested for the cure of existing evils are mainly upon the one hand moral suasion and temperance pledges, which are much relied upon by some teetotalers, whilst others go for legislative restrictions upon the traffic. Upon this persuasive or pledge aspect of the case it may be remarked that whilst most indisputably great good has been done by teetotalers both in the prevention and cure of drunk-

eness, and especially by preventing the use of drink amongst the young, thus guarding against the habit, multitudes who have signed pledges do not now abstain, and it is doubtful if much over ten per cent. of our adult population are abstainers from choice continuously. Whilst trade and social usages still make drinking alcoholic liquors an institution, no party or organization has yet adopted (here) the Maine liquor platform, but the United Kingdom Alliance proposes to give to parishes and municipalities (by imperial legislation) powers to prohibit the common sale of intoxicating drinks upon the vote of two-thirds of the rate-payers to that effect.

Another organization exists for the suppression of Sunday trading and another for restriction and regulation of hours, &c., of public houses, whilst another section of reformers (who are not yet an organization) suggest that legislation either imperial or permissible to localities should close drinking houses, but not prevent the importation, manufacture, or sale of drink "not to be consumed upon the premises," leaving all persons at liberty to buy and consume at their own houses. This latter would probably involve the recognition of hotels as the temporary homes of *bona fide* travellers and permit sale of drink in them to their lodgers. To this latter section of opinion Dr. Temple, Bishop of Exeter, has given the weight of his experienced judgment.

The non-abstaining reformers indicate mainly two agencies, one, the competition of scientific pursuits and amusements upon the Lord's Day with the open public-house, but it is justly responded that the people who drink evidence no such predilection for museums, scientific lectures, &c., as to make the experiment hopeful, whilst its friends do not evince much confidence in its success or they would provide such gratis, as is done by professors of Christianity who hire lecture halls, theatres, &c., for the preaching of the Gospel without money and without price.

The scientific demand, not a very loud one however, being that public servants in museums, libraries, &c., who are paid for six days' work should labor seven. The only legal obstacle, so far as known to me, being that as no charge can be made for admission on the Lord's Day to lectures or concerts they cannot be made self-supporting. That amusements would check drunkenness is a theory somewhat insisted upon, but as to which few, if any, proofs are alleged.

The sheet-anchor, however, of social reformers who are opposed to repressive legislation is education; educate the people, say they, and they will not drink. But at the threshold practical men meet this by denying that it can be done. Twenty thousand street Arabs

need education in Liverpool, but they need food first; as they are the children of drinking parents they must beg or steal, sell matches or in some inscrutable way get bread; shut them up in schools and educate them; £40,000 per annum will do this; but to feed them, and feed you must, if the parents go on drinking, £200,000 more is needful. Besides it by no means follows that in the next ten years your 20,000 will fall to 10,000 needing sustentation. It is more probable it will increase to 40,000, as, if the drunkards' children are fed and educated at the public cost, an increase may be expected to follow from natural law.

I have endeavored to place before you facts and theories, well knowing that the intelligent persons for whom you seek the information are well able to sift, and I hope in due time to be favored with a sight of the results of their inquiries.

Some extended knowledge of the people of this United Kingdom and short visits to our great colonies upon the St. Lawrence, Hudson, Delaware, Chesapeake, Ohio and Mississippi, as well as "the Hub" itself, have impressed me with the idea that our Great Family have a mighty part to play in the world's history, but that if the Anglo-Saxon race is to lose its primacy amongst the nations it will be from the miry clay of drunkenness destroying the cohesion of its iron nature, and whenever the stone may strike the right foot in England or the left in America it will be the just judgment of the mighty Ruler amongst the nations, who is even now warning us unmistakably to set our houses in order if we would retain the high place he has given our ocean-parted yet heart-joined nation in the midst of the earth, for England and America are one in origin and destiny.

I remain, my dear sir, yours faithfully,

JOHN PATTERSON.

P. S.—Adulteration is alleged upon most respectable authority to be chargeable with much of the deadly effects of drink, but I am not aware of any facts disclosed upon coroners' inquests or elsewhere which indicate that one person out of each hundred "slain by drink" was poisoned by any substance other than alcohol. J. P.

LONDON, 21st April, 1870.

DEAR SIR:—Your letter of 23d February last, requesting on behalf of the State Board of Health of Massachusetts information in regard to the influence of intoxicating drinks on national health and prosperity, was received a few days ago.

You propound two questions: 1st, "What are the chief intoxicating articles used in England?" In reply, I have to say that

the Board of Trade returns show that for the year 1869 there were bought in Great Britain for home consumption,—

Of foreign wine,	15,151,741 gallons.
Of home and foreign spirits,	29,407,499 “
Of ale and beer,	896,533,056 “

You ask, secondly, as to the amount of crime produced by them, and their effects on the health and prosperity of the people, with which question is coupled another as to the relative amount of intoxication in Great Britain and the United States.

You will pardon me if I do not attempt to give any answer to these inquiries.

The subject is too vast and too grave for me to treat of it superficially, and I have not the time, consistently with my attention to absorbing official business, to make investigations which would be of value to you.

I enclose two pamphlets, which seem to me to contain considerable and interesting information on the subject of temperance, although they have an unpretending appearance.

It will give me pleasure also to send you such other statistics or official information as I can find.

I am, very respectfully, yours,

JOHN LOTHROP MOTLEY.

UNITED STATES CONSULATE, MALTA, 13th May, 1870.

DEAR SIR:—In reply to your circular letter, dated 23d February, 1870, I have to say:—

1st. The chief “intoxicating articles” used in Malta are, for the native population, a common white wine imported from Marsala, Sicily, and a common red wine from Riposto di Mascali, Sicily, sold at three to three and a half pence per quart bottle.

The lower orders use also a common brandy from Sicily, frequently mixed with anise-seed.

The better classes use the principal wines of Europe, chiefly the red and white French wines, Madeira, Marsala, port and sherry, besides a sort of stomachic, which I hear is coming into favor, compounded of spirits, Peruvian bark and cloves or cinnamon. No wine is made in the island, and, I believe, no spirits.

As for the foreign population, which is almost exclusively English, their habits here are precisely what they are in all other parts of the world. They eschew the lighter wines, and drink beer of all

brands (English), heavy wines (sherry, port, Madeira and Marsala) and spirits.

2d. In the absence of any government bureau of statistics, I cannot accurately give the amount of crime due to drunkenness or effects on health and prosperity of the people. Among the soldiers and sailors—from five to six thousand—there is the usual amount of drunkenness to be found in a great garrison town. One of the chief surgeons of the fleet tells me there is more *pulmonary disease* among seamen here than at any other station in the British service, but he does not account for it.

The native population is certainly very temperate. The amount of drunkenness to be seen here is as nothing compared with what is seen in the United States. Yet I am told there is a manifest deterioration within the memory of observers—more intemperance and more disease or debility than a generation ago. I think it is due to the presence and example of the garrison.

Respectfully, your obedient servant,

LYELL T. ADAMS, *U. S. Consul.*

MANCHESTER, May 19, 1870.

DEAR SIR:—I have this day forwarded to you through the State Department an answer to your letter of 23d of February last making inquiries in regard to alcoholic drinks in this country.

I also send a report of the Committee of Convocation.

If your letter was mailed on the day of date, it must have been detained a long time on the way.

I am, respectfully, yours,

C. H. BEANSCOMBE, *U. S. Consul.*

UNITED STATES CONSULATE, MANCHESTER, May 19, 1870.

SIR:—In reply to your letter of inquiry dated February 23d, 1870, I have the pleasure to give the information attached, the result of investigations pursued by me personally, and by English friends with whom I have put myself into communication upon the questions referred to.

1. The principal intoxicating liquors used in England are gin, brandy, beer, wine and cider. The wine is chiefly imported, though varieties of "British wines," made from currants, &c., mixed with distilled spirits, are manufactured and sold. Among spirits, gin is chiefly used by the poorer classes and brandy by the richer; beer (including ales of every kind) is most largely used by all classes; wine is used by the wealthier, though cheap and highly

adulterated sorts are also in extensive use among the middle classes; cider and perry are mostly confined to some of the agricultural counties of the west and south.

In Scotland and Ireland the principal alcoholic liquor used is whiskey, though wine and beer are also consumed to a considerable extent. Since the reduction of the duty on brandy, this liquor is competing more than formerly with home-made spirits.

Rum is chiefly used by the middle and lower orders of the three kingdoms. Professor Levi estimated that, taking the proof spirit in each kind of intoxicating drink consumed in each kingdom, the consumption of proof spirit in 1866 per head was as follows:—

PROOF SPIRITS USED.	ENGLAND. Imperial Gallon.	SCOTLAND. Imperial Gallon.	IRELAND. Imperial Gallon.
In Gin and Whiskey, . . .	0.536	1.659	0.800
In Brandy, Rum, &c., . . .	0.328	0.188	0.057
In Beer and Ale,	3.393	1.050	0.710
In Wine,	0.159	0.087	0.064
In Cider and Perry,	0.021	—	—
	4.437	2.984	1.631

(English proof spirit is about one-half alcohol and one-half water, or exactly by volume, alcohol .57, water .43; by weight, alcohol 49.24, water 50.76.) Thus the annual consumption of alcohol in England, chiefly in the form of beer, is two gallons and a gill, in Scotland one gallon and nearly a half, in Ireland rather more than four-fifths of a gallon. There is, however, no means of accurately estimating the quantity of beer and wine used in each kingdom distinctively, the estimate of the population of Ireland in 1866 being more uncertain than for that of either England or Scotland.

2. All the law, judicial, police and other authorities in this country concur that a very large proportion of the crime and poverty, sickness and premature death, is caused by the drinking habits of the people; and not merely by the grosser forms of intoxication which too visibly prevail. Of crime, it is considered that two-thirds, and of poverty three-fourths, arise directly or indirectly from the use of alcoholic liquors. Much valuable information on this subject is contained in the report of the Committee of Convocation appointed to inquire into the extent and action of intemperance, a copy of which accompanies the present letter.

Here, as in the United States, the drinking customs render much

crime possible which else would be impossible; they also prompt and excite to criminal offences of all kinds; they bring great numbers into a condition where they readily become subject to criminal attacks; and they plunge vast masses into a low and degraded social state, from which the transition into crime becomes easy, rapid, and humanly speaking, in the case of multitudes well nigh inevitable. The statistics of drunkenness give no proper conception of the extent of that vice; for, unless incapable or violent, intoxicated persons are seldom arrested, and the process of manufacturing sober men and women into drunkards goes on with steady regularity in the drinking shops of all classes without any practical hindrance from the administration of the law. So long as very flagrant and repeated disorder is avoided, the publican or beer-seller is sure to remain in undisturbed possession of the license when once granted; and even where police charges are made and convictions ensue, a reprimand or warning is usually all that is administered at the annual licensing day.

Upon health, life and commercial prosperity, the drinking customs act very injuriously, and not least when the signs of external excess are absent. The great quantities of beer drunk in England slowly but certainly sap constitutional vigor, and, according to high medical testimony, there is no form of disease which does not find food and fuel in the vital degeneration brought about, even where there is a complaisant confidence in the innocuousness of so-called "moderation."

The inquests in England and Wales (inquests are not held in Scotland and Ireland) in the year ending September 29th, 1868, were 24,774, and every coroner confesses that, besides the number of cases in which excessive drinking is distinctly named as the direct cause of death, a very large proportion of the other cases springs, either from the physical effect of intemperate or tippling habits from the congenital disease, or from the destitution or recklessness connected with the drinking habits of fathers and mothers.

The commercial interests of the country suffer sadly by the poverty and pauperism, created by the idle and irregular habits thus induced, by the loss of skill and vigor attending alcoholic indulgence, and by the enormous expenditure of money on the purchase of intoxicating liquors, amounting to a hundred million sterling, besides the waste of grain, capital and labor, in the production of such drinks, and above all, of the labor force wasted in the excitement of drinking.

3. Comparing certain towns in the two countries most nearly alike, as Liverpool and New York, Bradford and Cleveland, Bristol

and Boston, and certain corresponding classes, such as the commercial, the fast and the fashionable, one does not see much difference as to the prevalence and results of drinking. The disorder, degradation, pauperism, prostitution, lunacy and crime are in both appalling. But on the other hand, looking at the moral and religious classes in the smaller towns and villages of the two countries, comparing the social and domestic usages of the respectable classes of our New England States, or of Pennsylvania and of Ohio, with the corresponding classes and communities of England, there can be no doubt that the balance of sobriety is very greatly in favor of the former, and more particularly of Connecticut, Rhode Island, New Hampshire, Vermont, Massachusetts and Maine.

In this country there are hundreds of villages, some large districts and several little towns, from which the liquor traffic has been banished by magisterial and proprietorial power with the most gratifying results. Crime has ceased, pauperism has almost vanished, lunacy has disappeared, and industrial and moral progress has been made. These facts seem to have taken hold of the hearts and thoughts of the people, and some years ago an agitation (under the direction of the United Kingdom Alliance for the Suppression of the Liquor Traffic) was commenced, which has risen into great political influence. Its parliamentary leader, Sir Wilfred Lawson, Baronet, M. P. for Carlisle, supported by Sir Thomas Bazley, Baronet, M. P. for Manchester, is about to introduce for the third time, his Permissive Bill into the House of Commons, which proposes to give to all the rate-payers and owners of property the power to veto the common sale of intoxicating liquors within their parish or district. The second reading of this bill is fixed for the 13th July next. Eight hundred thousand persons petitioned for the passing of the bill last year, and 94 members voted for it, representing a constituency of 7,000,000.

I remain, yours, very respectfully,

C. H. BRANSCOMBE,

United States Consul, Manchester.

UNITED STATES CONSULATE, ODESSA, RUSSIA, }
May 4, 1870. }

DEAR SIR:—In reply to the questions placed in your favor of February 23d,—

The chief intoxicating article used here is "vodka," or in plain English, *whiskey*. It is made and sold under the direction of the government. It is prepared in different forms,—that is, clear and



pure; clear and sweetened; colored (in tempting colors), such as green, red, yellow, rose; and also flavored with different spices and herbs. It is sold, I am told, in something like two thousand "licensed horrors" in this city, and at every little village and station all through the country, at the very moderate price of about three to five cents a gill. This is the strong drink of the common people (as they are called), emancipated serfs, laborers, soldiers and their females, who frequently outdo their husbands and brothers.

Wine is made (red and white) in large quantities in the Crimea, in Bessarabia, and in the different German villages (of which there are many in the south of Russia), and to some extent in the Russian villages. Quantities of it are brought into this place in large casks (of two hundred gallons) in the autumn, and sold (the pure unfermented juice) for, say, twenty to fifty cents a gallon, and afterwards retailed out at higher prices, say, twenty to fifty cents a bottle. Excellent brandy is distilled in some places from the wine of this country. Beer and ale are also made here. Besides this, all kinds of liquors, wines, cordials, beer, porter, are imported from other countries and sold without restriction except the duties and tax for license. These articles are mostly used by the different strata of society above the "common people" or peasantry.

It is the custom, very general with these classes, to have wine at least for dinner (frequently for breakfast also, at ten, eleven or twelve o'clock), and very often they begin with a small glass of raw brandy or other spirit.

There are wine tipplers and jolly parties who drink wine and beer (perhaps even spirits) at all hours of the day and night, but such persons are, for the most part, idlers and shiftless persons or young rowdies, the custom being to drink little at other times than breakfast and dinner. It is rarely seen, a drunken person of the classes last mentioned.

You may meet them, often enough a little hazy after dinner, and often enough their appearance indicates free living, but seldom are they to be seen past perfect self-control.

Those who drink "vodka," on the contrary, are often to be seen staggering about (men and women), or lying in some corner insensible. This is much more often the case on Sundays and holidays, of which latter the number is very great in Russia.

There are no statistics as to the amount of crime chargeable to intoxicating or exciting drinks, but from my own observation, I should say at least three-fourths of all. They are, without doubt, a great plague and drawback to material and moral progress in this country. The effects of all such exciting drinks are, in my opinion,

prejudicial to the health, happiness and prosperity of those who habitually use them, and, generally in proportion to the freedom with which they are used.

The moderate and immoderate drinkers, if they be habitual, are all sufferers, and visibly sufferers in these three respects. My own belief is, whiskey, rum, gin, brandy, wine, beer, ale, porter,—all bad, and the stronger the worse.

I might add coffee, tea, tobacco and all unnatural excitants of the nervous, muscular and circulatory systems.

Very respectfully, yours,

TIMOTHY C. SMITH.

TENERIFFE, July 15th, 1870.

DEAR SIR:—A very long time has elapsed since the receipt of your favor of February 23d, making some inquiries respecting the use and abuse of intoxicating drinks in this island, the reason for which has been, that there being no statistics on the subject, I asked one of the principal physicians to give me his and some of his colleagues' opinions on the subject, which he promised to do; but Spanish like, this was put off from day to day, until at last he suddenly embarked for Spain, but promising to be back in a month, I still waited for him. On his return he again renewed his promise, but nearly a month having elapsed without his reply being received, I have resolved not to wait any longer, but to address you now in answer myself, and whenever his opinion is received, I shall send it to you.

Your first question is, what is the chief intoxicating drink used in these islands? Up to 1845 this was eminently a wine-producing country, this island alone having produced as much as 25,000 pipes. The oidium having destroyed the vines about that time, the drinks substituted have been the rum of West Indies, and gin of England and Holland. You are of course aware that in wine-producing countries intoxication is rare, and this was the case here while only wine was drank; since then the vice has increased, but not to any considerable degree, although I should say that the use of alcoholic drinks has told upon the health and shortened the lives of many, and perhaps caused some crimes.

I should say that there was far less intoxication here, among a given number, than in the United States, owing to the Spaniards being an abstemious people generally, and I don't know where you can find a soberer class of people than the peasants of these islands.

I remain, your most obedient,

WM. H. DABNEY.

UNITED STATES LEGATION, VIENNA, }
June 17th, 1870. }

SIR:—In reply to your circular note, dated February 23d (but which did not reach me until a much later date), asking for advice touching the intoxicating drinks used in Austria, and their effect upon the health, prosperity and morals of the people, I beg to say that I have delayed my response, in the hope of procuring some reliable information, which I have not yet received.

Upon the receipt of your letter, I requested Mr. Delaplaine, the Secretary of Legation at this post, who has lived in Vienna some sixteen years, and has a large circle of acquaintance, to apply to such gentlemen as he thought might be able and willing to answer your questions.

Most of those to whom he applied seemed unable or unwilling to give their assistance, {but Dr. Adolph Ficker, one of the Court Counsellors, and a Director of the Administrative Statistical Bureau, obligingly promised to examine the matter carefully, and report in writing, with statistics of the amount of alcoholic and other liquors consumed in the empire. As the promise was given several weeks since, Dr. Ficker's report has been for some time expected at the Legation, but it has not yet been received. I have also made a request at the Foreign Office for such information as may be gathered in the Bureau of Statistics, and I am in hopes of being soon able to send you, in part at least, satisfactory answers to your questions.

In view of the short time that I have been in Vienna, and of my very limited opportunities of observation in the provinces, I am sensible that my opinion (for which you are pleased to ask) upon a question so properly soluble by statistics, and by a comparison of the opinions of many experts, can be of little practical value.

I am advised by those in whose judgment I have confidence, that the chief intoxicating drinks in Austria are beer and wine, and that but comparatively a small amount of spirituous liquors is consumed, excepting in Galicia; that the relative consumption of wine by the people is diminishing, and that that of beer is increasing; that the beer in general use is of a light kind, requiring the consumption of a large amount either to stupefy or to intoxicate; and that the influence of intoxicating drinks in Austria in producing crime is less marked than in our own country, and in England.

Touching "the relative amount of intoxication in the country where I am residing and that seen in the United States," I may say that I have seen more intoxicated persons in the streets of New York in one day than I have chanced to see in Vienna during the past year.

I am sir, very respectfully yours,

JOHN JAY.

[TRANSLATION.]

REPORT FROM STATISTICAL CENTRAL BUREAU OF AUSTRIA, TRANSMITTED THROUGH THE I. R. MINISTER OF FOREIGN OFFICE TO MR. JAY.

Consumption of spirituous liquors in Austria-Hungary.

The use of spirituous beverages in the Austro-Hungarian monarchy can only with approximate exactness be determined from the annual production, and with proper consideration of the transfer in way of trade. We here present estimates of the following quantities for the whole monarchy during the last five years:—

Production and Consumption in Austria-Hungary, from 1864 to 1868.

	Quantity.	1864.	1865.	1866.	1867.	1868.
Production,	Eimer,*	13,848,979	13,943,217	13,597,450	12,887,591	13,833,844
Import,	Eimer,	8,507	7,507	4,895	4,395	5,669
Amount, . . . . .	.	13,857,486	13,950,724	13,602,145	12,891,986	13,839,513
Deduct export,	Eimer,	88,139	136,569	130,115	216,433	289,875
Total consumption, . . . . .	.	13,769,347	13,814,155	13,472,030	12,675,553	13,549,638

Production and Consumption of Wine in Austria-Hungary, from 1864 to 1868.

Production,	Eimer,	18,760,600	18,760,600	18,760,600	18,760,600	18,760,600
Import,	Eimer,	92,244	124,866	72,684	73,428	81,174
Amount, . . . . .	.	18,852,844	18,885,466	18,833,284	18,834,028	18,841,774
Deduct export,	Eimer,	227,366	169,826	161,780	206,713	254,585
Consumption in the country, . . . . .	.	18,625,478	18,715,640	18,671,554	18,627,315	18,587,189

* According to the "American Cyclopædia," the Eimer is equal to 12.457 gallons.

Production and Consumption of Brandy in Austria-Hungary, from 1864 to 1888.

	Quantity.	1864.	1865.	1866.	1867.	1868.
Production, . . . . .	.	3,255,236	3,371,541	3,457,400	2,945,880	3,666,846
Import,	Eimer, .	10,968	11,018	10,854	13,510	14,935
Total, . . . . .	.	3,266,199	3,382,559	3,468,254	2,959,390	3,681,781
Deduct export,	Eimer, .	70,647	91,529	100,159	152,183	304,310
Total consumption, . . . . .	.	3,195,552	3,291,030	3,368,095	2,807,207	3,377,471
Consumption for objects of trade,	Eimer, .	651,047	674,308	691,480	589,176	733,369
Balance consumed for drinks, . . . . .	.	2,544,505	2,616,722	2,676,615	2,218,031	2,644,102

If there be adopted, pursuant to the official trade valuation during several years, an eimer beer at five florins, an eimer wine at eight florins, and an eimer brandy at twenty-three florins, the result is, by an estimate of thirty-five millions of population, an average annual expenditure for each individual of four florins twenty-six kreuzers for wine, one florin twenty-nine kreuzers for beer, and one florin sixty-seven kreuzers for brandy, whereby each would expend annually seven florins eighty-five kreuzers for spirituous beverages.

This consumption must be held as being extraordinarily greater if it be contrasted with the use of other products, in the quantity of which a graduated rule for the social development may be found.

So, for example, it is ascertained that out of the annual quantity of cast-iron and wrought-iron products and steel in Austria and Hungary, 3,560,000 centner in weight are required for the use of the agricultural economy. A centner of weight in such products, estimated at nine kreuzers, would allow for the expenditure for iron during the year the sum of ninety kreuzers for each individual of the entire population. Accordingly each inhabitant of Austria-Hungary would be expending for spirituous liquors eight times as much money as for iron, the most important agent of active industry.

Naturally what has been suggested here can only be regarded as an average estimate upon the whole consumption, inasmuch as the use of spirituous beverages varies exceedingly not only with individuals, but in the different provinces of the Monarchy. Especially can three groups of provinces be named as varying most: 1, the actual German provinces, with Bohemia, Moravia and Silesia, in which the consumption of beer plays the most important part; 2, the Hungarian provinces, where the use of wine is greatest; and 3, Galicia, with the North of Hungary, and Transylvania also, but in a less degree, the Alpine Highlands at the west, where most of the brandy is consumed; and although specific numerical statements cannot be adduced, yet the effects of this consumption upon the social development is an undeniable fact.

Already the wine-consuming Hungarian population, as regards the degree of industrial and professional ability, stands in the eyes of every impartial observer much below that which the inhabitants of the western provinces of the Monarchy have attained, while the Galician peasant, who ruinously exchanges for brandy his corn before it is ripe and yet in the pod, is lowest in the scale of industrial development.

He knows nothing of the valuable resources for improvement in

agriculture, secured through industry and science, and grows visibly poorer.

Indeed the degeneracy of the race in Galicia, although perhaps other agencies may contribute to it, is to be sought mainly in the excessive indulgence in corn-brandy; and thence it comes to pass, that out of the men called to military duty in Galicia, 37.9 per cent. are rejected as unserviceable on account of physical disability and infirmity, and 18 per cent. on account of under stature; accordingly in all 55.9 per cent. of those called are found unserviceable, whilst in the entire Monarchy only 9.2 per cent. appear as unserviceable for the army through under size, and 33.5 per cent. on account of physical disability and infirmity.

Temperance societies have as yet never been started in Austria, and the attempts at such, made particularly in Galicia, in imitation of those in some communities in Russia, have been without a successful result, mainly because of the "Propinations" privilege which exists and produces a large revenue to the landed proprietors, who therefore oppose to the utmost all such attempts, which may reduce their incomes.

I have been informed that the "Propinations" privilege consists in the right, claimed by land proprietors, and included in every lease from them to inn or tavern keepers, requiring the latter to purchase from the land proprietors all stores of spirituous liquors to be consumed in such inns or taverns, or, if that right be waived, then, that a large pecuniary consideration for the same be annually paid to the land owners.

ZURICH, May 10th, 1870.

DEAR SIR:—Your letter making certain inquiries about intoxicating drink, &c., &c., is at hand. In reply permit me to say that my residence here has been of but a few months' duration, hence my observations have not been very extended; but to the questions:

1st. Sour wines and lager-bier are used here in immense quantities. French and German wines are also used, but in much less quantities, by those able to import.

2d. I judge that the per cent. of disorder and crime arising from the use of intoxicating drinks is large. Yet I find no statistics on the subject. I am positive, however, that the effects on health and the prosperity of the people are very bad.

I am credibly informed that in certain cantons where wine in very great quantities is used, steady nerves are *rare*, while a great *tremulousness* of the hand is *common*. I am impelled to believe however, that intoxication prevails to a less extent in Zurich than

in American cities. Poor or sour wine and beer stupefy more than they intoxicate when used in ordinary quantities.

I am not in possession of any printed statistics on the subject, or I would forward with pleasure.

Very respectfully,

S. H. M. BYERS, *U. S. Consul.*

UNITED STATES CONSULATE, FUNCHAL, MADEIRA, }
MAY 8th, 1870. }

• SIR:—I have the honor to acknowledge the receipt of your communication of February 23d, last past, requesting certain information in regard to the use of intoxicating drinks, and their effects upon the population of this island.

In regard to your first question, I have to say that the chief intoxicating drinks are wine and cane brandy; the former mild, but yet a heavy-bodied wine, and the latter inferior to the grape brandy of France, yet stronger than our American whiskey.

In answer to your second question, I have to say that the people here are a most exemplary people in the main, in regard to the use of intoxicating articles. Few are seen drunk, or even overly excited from the effects of drink. Indeed one seldom hears of a person being destroyed from its use. Considerable amounts of both brandy and wine are, it is true, consumed by the population, the better classes using wine daily at dinner, and the commoner people using both wine and brandy, without reference to time, but yet in great moderation. You can therefore well understand, that as a consequence, there are but few cases of crime resulting from their use. Indeed, I believe I have not heard of a single case since I am on the island, now going on five years. As to the impression upon the general prosperity of the masses, I think it is somewhat damaging, as the price of ordinary labor is very low, thirty cents per day being the price to a common laborer, which is in itself scarcely sufficient to maintain a family, even in the midst of almost the greatest poverty, since every cent taken from that amount for brandy or wine is most seriously felt by the poor families; and as nearly all drink a little, the amount of absolute poverty is very great.

As to the relative amount of intoxication in this island, as compared to the United States, I must say, that whilst no statistics are kept or collected by any one, yet I have no hesitation in giving it as my opinion, that the difference is greatly against our people in America.

I regret that I am unable to forward you any statistical information upon the subjects you have referred to.

With great respect, I have the honor to be, your very good friend,


CHAS. A. LEES, *U. S. Consul.*

UNITED STATES CONSULATE-GENERAL, BEIRUT, SYRIA, }
May 9, 1870. }

DEAR SIR:—Referring to your communication of the 23d February, I have the honor to observe that the influence of intoxication upon the people of Syria is almost imperceptible.

The native wine is not made in large quantities, yet sufficiently so as to give the middle class population at least, the use of that beverage, but its effect as such, is not to produce intoxication, which is almost unknown. There is, however, a colorless liquid called arak or rakia, which is distilled from the wine or made from the pumice. This is very intoxicating, but is used so temperately as to seldom produce bad results. Dr. Thomson, who has resided in Syria for about thirty-five years, says that he never saw a drunken man during the larger part of that time. During, and since the French occupation, which followed the massacres, foreign wines and some other liquors were introduced, and the former is now to be seen in many of the more wealthy families, yet almost never used to excess. There are two classes of the population upon whom the introduction of foreign brandy and whiskey is known to produce bad effects—the Turks or official class, and the lower foreigners, such as Greeks and Italians. Not until recently could a dram-shop be found, but now there are several, patronized almost exclusively by the low class of foreigners.

Your second question is in effect already answered. There being almost no intoxication, still less can crime be traced to that cause. In fact, very little crime is committed in Syria. Formerly, in the mountain districts of Lebanon, the existence of blood feuds led to many violent deaths, but the killing was done openly and in the name of justice. Three executions by Daoud Pasha, the first Christian governor-general after the massacres, have had the effect of almost suppressing this ancient custom. It happens now occasionally that different villages or factions will have a bloody affray, but the cause is generally some religious superstition. The larger part of the cases which come before the Turkish and consular courts relate to property and contracts, rather than crime. Assault, burglary and assassination are almost unknown, though a few horrible cases of the latter have occurred, yet have never been traced to the use of intoxicating liquor.



If the use of liquor in the general, but temperate manner habitual with this people has a gradual undermining effect upon health or constitution it is impossible to estimate it, nor have medical men given the question their attention.

I do not believe the people are less prosperous on account of its use, according to their customs, not because there would be no saving if they would abstain, but rather because their recreation and dissipation take such a mild, harmless form, that those who are most interested in their welfare would not interfere with their long established and harmless usage, believing that if they were led to abandon these habits—perhaps not entirely unobjectionable—they would in pursuit of recreation fall into the worse habits which a higher civilization generally brings with it.

Whoever has seen these people after the day's confinement in the close, dark, dirty bazaars, and the muezzin has sounded for evening prayers, assembled under large arbors in the public places, generally on an elevation where the cooler winds may reach them, seated on low stools smoking the nargelia, drinking coffee or arak from the smallest of cups, listening perhaps for the hundredth time to a story teller, who with wild gestures is reciting the tale of Ali Baba and his forty thieves; sitting thus for one or two hours after sunset, and then returning quietly to their homes until the streets become as noiseless and deserted as those of Palmyra, most of those who have thus observed their habits will not be inclined to condemn them very severely.

After the foregoing it will be unnecessary to express an opinion as to the relation of the amount of intoxication seen in this country to that of the United States. It would be impossible to give statistics, either as to intoxication or crime as no records are kept. My remarks are the result of observation only; but I am sustained by the opinion of some of the most reliable residents.

I am, sir, very respectfully, your obedient servant,

LORENZO M. JOHNSON,

Vice-Consul-General in charge of the office.

NO. 30 CHATHAM STREET, COLOMBO, CEYLON, 13th August, 1870.

SIR:—On the 30th of May last, I had the honor to address you in relation to your letter received on the 17th of that month.

I have found it more difficult than I anticipated in obtaining the required information, either from a disinclination or want of time on the part of some of the government officials.

I am informed a census is being taken, and when the Legislative

Council convenes, which will be in the latter part of September, I may be able to send you more and later information.

Since my arrival in Ceylon, I have been located at the seaports of Galle and Colombo, in the most southern extremity of the island. It will therefore be out of my power, from my own experience, to give you any more information than is customary, where, in a foreign port, the jack-tars of all nations have a day's liberty on shore. From your queries, I am of opinion, you desire more particularly information in regard to the native inhabitants of Ceylon.

I therefore annex copies of letters on the subject, with which I have been kindly favored by parties who have been born on the island or have been long residents, which I trust you will find of interest. The first is from Dr. Julian L. Vanderstraaten, Assistant Colonial Surgeon for the Southern Province.

1st. All the European liquors are used by the better class. Chiefly drink arrack, which is prepared by the distillation of toddy, and is not unlike whiskey.

The juice of the flower and stems of the palm tree yield the sweet liquor called toddy; it contains sugar, and when drunk in the cut of the morning is an agreeable beverage which acts like a mild aperient; when the day gets warm it begins to ferment, and in this stage is prepared by the lower classes as an intoxicating liquor owing to its being very cheap. When this is fermented for days, it becomes converted into good vinegar, but the larger quantity is distilled for arrack.

2d. There is no doubt that the sale of arrack at a cheap rate (nine pence half-penny per bottle) has caused a great increase in crime of late. The natives, "Arrack Renters," as they are called, purchase the right of selling arrack from government at the annual sales, and then open taverns in the villages and towns. Under this system the illicit distillation is checked; by which a large revenue is obtained, and the use of arrack becomes much more common than before. The sober and steady class of natives, although exceedingly fond of litigation, seldom commit any serious crimes excepting once a year, viz., at their Singhalese New Year, 11th April, when they make merry, imbibing a good portion of arrack, under the influence of which they become quarrelsome and end by knocking each other over the head with clubs. It is only in cases of revenge and jealousy that crimes are committed without arrack being the inciting cause. When assassins are hired to commit a murder they can only be compelled to do it under the influence of arrack, money being no consideration with men of this class.

The use of arrack, particularly the fresh liquor sold in taverns,

speedily induces inflammation of the liver which ends in dropsy. Good old arrack seasoned in wine cases is a choice liquor. It is only served to troops after having been kept for years in store.

“Arrack drinkers are by no means industrious; they sleep away their time, while the female portion of the community have to work for their upkeep.”

Dr. Samuel F. Green, of the American Mission, located in the extreme north of the island, has favored me with the following answers to your queries, viz.:—

“1st. Palm toddy and arrack.

“2d. A great deal of crime, the effect on the health and prosperity of drunkards and their households markedly evil.

“3d. I should think it about equal.

“As the sale of arrack and toddy is favored, the comparative amounts paid annually, would elucidate the subject.

“I trust the investigation of the Board of Health may result in the formation of some effective plan, for the lessening of this great scourge of the human race.”

The Rev. J. C. Smith, also of the American Mission in the north of the island, writes,—

“My own impressions accord with Dr. Green’s,—this system of arrack rents is an unmitigated evil, and ruins many every year. We hope the agitation of the subject may result in checking the increase of the evil.”

James Loos, M. D., Member of the Royal College of Physicians, Edinburgh, colonial surgeon, born in Ceylon, has also favored me, viz.: “The chief intoxicating articles in use among the natives of Ceylon are *arrack* and *toddy*.

“Toddy is the juice drawn from cocoanut palm in all parts of the island, except the north, where it is obtained from the palmyra (*Borassus flabelli formis*). The toddy is a favorite beverage. In its fresh state it is sweet and pleasant and can scarcely be said to be intoxicating, but it is not sold in the taverns for use until it has undergone fermentation to some extent, when it becomes sour and intoxicating. The spirit obtained from the distillation of toddy is arrack, which may be said to be the national drink of the Singha- lese. The right to distil arrack is sold annually by government with whom it is a source of revenue. The arrack renter, as he is called, sells spirits by wholesale to tavern-keepers. Opium and Ganjah or hemp, are used by the Malays and Hindoos, and some of the natives of Ceylon have imbibed a taste for these drinks, but they cannot be said to be in common use. There is a large con-

sumption of brandy, beer, and the common beverages of the European. These are more plentiful and cheaper in the shops now than formerly, and the natives in towns prefer them to arrack and toddy, which they regard as common and vulgar drinks.

“There is no doubt that a large amount of crime in this country arises from the use of intoxicating drinks, and that their effects on the health and prosperity of the people are very marked. Cases of horrors (delirium tremens) are not found among natives, and it is believed that the use of arrack does not produce it; but I have frequently traced the occurrence of other diseases among the natives, to the abuse of alcohol. I am aware, that in the country, taverns have sprung up of late, which did not exist before, and that dissipation and crime have increased in the villages.

“I fear you are not likely to obtain official statistics of the amount of crime caused by intoxication anywhere. We are still greatly behindhand in such matters. We are only now beginning to take steps to obtain a correct census of the island, and to register properly births and deaths.

“When I had a medical connection with the principal jail in Colombo, it was not customary to inquire into the habits or previous history of prisoners; but it is possible that some advance has been made since that time in the collection of information on these and other points.”

I find in the “Colombo Observer” of 21st of July, an article, by its editor, headed,—“Crime in Ceylon and its Causes,” which has a bearing upon the subject under discussion, and I think will not be considered out of place:—

“Believing as we do in the dangers of moral contagion, we have endeavored to steer clear as much as possible of the law courts and their surroundings. A period of enforced attendance as juror, however, has certainly given us a view more vivid than ever of the prevalence of crime around us, even in the districts where Christianity, in some form or other, has been taught for lengthened periods. The comparative impunity too with which wrong-doers can long pursue a career of crime, without the arm of justice being able to reach them, has been forcibly impressed upon us by the details of a case from Minnangodde near Negombo, which occupied the whole of the 19th, and with reference to which the jury felt compelled by a sense of duty, to ask the presiding judge to make a representation to the executive government. Minnangodde is close to Negombo, which is the seat of a district judge, the village has the usual complement of peace officers, and a regular police station stands within a short distance of it. The Roman Catholic missionaries have been at work around Negombo for centuries, and for about half a century the Wesleyans have done their best for the people, and yet with reference to events which took place near Minnangodde in December, 1869, the serious attention

of the executive government has to be called to the fearful state of disorganization and crime into which the district had fallen. A regular manufactory of crime and criminals seems to have been kept for years by the Vidahu of the village, where cock-fighting, gambling, and arrack drinking were pursued day and night. At length a wretched gambler was deprived of life in the Vidahu's 'hell,' and although all who ought to have aided justice (including the regular police) seem to have done their best to defeat the efforts made to punish the criminals and repress crime, retribution at last overtook the leading wrong-doers. Under the auspices of the Vidahu, at his direct invitation, it would seem a crowd of people, not fewer than a hundred probably, assembled to witness cock-fighting, to drink arrack illegally sold to them, and to take part in gambling. Those who went inside the gambling house actually paid an entrance fee of one shilling each to the Vidahu (the man who had been appointed by government specially to repress such breaches of the law), and he and a henchman of his seem to have held the stakes. It came out in evidence that the man who met his death in the gambling house had placed £20 in the hands of the Vidahu, depositing £8 with the other man. A witness questioned as to the possibility of such large sums changing hands amongst native gamblers, insisted that similar transactions were not uncommon. Be this as it may, the unfortunate gambler, who was excited by drink, asked for some of his money back, and not getting what he considered enough applied insulting terms to the Vidahu. The latter gave the order 'strike,' an order which his assistant readily obeyed, the man was seen to be violently kicked and beaten, and was heard to cry out 'Oh! I am lost!' a hand was seen to take hold of his throat, and then the lamps were overturned. In the darkness there can be no doubt the victim was strangled to death, the post mortem examination disclosing all the usual signs of strangulation, while such violence was used that the larynx was displaced. The Crown, as may be imagined, experienced great difficulty in obtaining evidence, and one of the witnesses had himself the charge of murder hanging over him. The jury, however, though they mercifully acquitted the prisoners of murder, had no hesitation in finding them guilty of manslaughter, a verdict in which the presiding judge said he fully agreed. Mr. Justice Lawson in passing sentence, dwelt on the peculiar atrocity of the conduct of the peace officer in systematically violating the laws he was appointed to enforce. As a warning to other head men an exemplary sentence was necessary. The Vidahu, therefore, would be punished by ten years' imprisonment with hard labor; his companion receiving a punishment lighter by one-half. The surprise and despair of the well-to-do prisoners, who had evidently calculated on an acquittal, were extreme, and we trust the moral effect in Minnangodde and elsewhere will lead to much needed reformation. There can be no doubt that arrack drinking and gambling are at the root of much of the crime committed in Ceylon, and that the police, rural and regular, require, to say the very least, strict looking after."

In looking over the Administration Reports, for 1868, just issued, I find there is no mention of intoxication or drunkenness. I subjoin the statement contained therein of the revenue, derived by

government, sold in the different provinces, to the arrack renters, viz. :—

PROVINCES.	1897-98.	1898-99.
Western,	£70,696 5s. 9½d.	£63,986 5s. 10d.
Central,	49,800 0 0	48,505 0 0
North-Western,	10,823 8 0	12,393 14 7½
Northern,	3,963 0 0	3,629 0 0
Eastern,	4,230 10 0	4,057 6 8
Southern,	1,326 13 4	1,094 14 6
	£140,839 17s. 1½d.	£133,666 1s. 7½d.
Total in American gold, .	\$681,664 88	\$646,943 72

I have the honor to be, sir, with respect, your most obedient servant,

GEORGE W. PRESCOTT, *U. S. Commercial Agent.*

CONSULATE OF THE UNITED STATES OF AMERICA, }
YEDO (TOKEI), JAPAN, July, 1870. }

SIR:—Herein is the report of Dr. J. H. Kidder, U. S. Navy, to whom I referred your letter of February 23d.

Dr. Kidder has spent much time in studying the Japanese, their character and habits, and I take pleasure in forwarding his opinions, knowing them to be the intelligent result of careful investigation.

I am, sir, very respectfully, your obedient servant,

C. O. SHEPARD, *U. S. Consul.*

U. S. STORESHIP "IDAHO," 1ST RATE, }
HARBOR OF YOKOHAMA, JAPAN, July 8th, 1870. }

SIR:—I beg leave to acknowledge the receipt of your letter of June 28th, inclosing a communication (herewith returned) from Dr. Henry I. Bowditch, chairman of the State Board of Health of Massachusetts, which contains certain inquiries concerning the use and abuse of intoxicating liquors in Japan.

I take great pleasure in complying with your request and answering Dr. Bowditch's questions to the best of my ability, although the accuracy which he desires is not attainable in this country as yet, both on account of the peculiar light in which intoxication is looked upon in Japan, and the fact that it has not, so far as I can learn, ever been made the subject of official investigation.

1st. *Saki* is the generic name for all native intoxicating drinks. They agree in that they are all obtained by the distillation of rice, but differ greatly in strength and flavor, according to the degree of dilution and mode of manufacture. While some varieties resemble liqueurs, being of great strength, largely sweetened and highly flavored with aromatic herbs, others, equally intoxicating, are fiery, acrid and unpleasant to the taste, and others still (these the brands in common use), are largely diluted with water, mawkish and slightly nauseous in taste, and not more intoxicating to foreigners than ordinary draught ale or old cider. A specimen of this commoner sort, taken at random, I have found to contain about eleven per cent of alcohol. A brand of especial excellence, known as the Sho-gwats saki (New-Year's wine), and produced only at New-Year's calls, is in flavor and strength not unlike the common Rhine wines. The natives themselves are remarkably susceptible to the influence of saki, and show by flushed faces and excited bearing a marked degree of intoxication after drinking an amount which makes scarcely a perceptible impression upon foreigners. The cups in universal use for saki are exceedingly small, rarely holding so much as a fluid ounce.

2d. The amount of crime which can be directly traced to intoxication in this country is almost inappreciable, and this is due, as I think, to the following among other reasons: first, the mild and inoffensive type of the national character, which impels the people when drunk, rather to dancing, singing and displays of affection, than to combativeness; secondly, the great dilution of the ordinary qualities of saki, almost universally used; thirdly, the small size of the drinking cups mentioned above (perhaps this is rather effect than cause); and fourthly, the state of public opinion, which looks upon intoxication as a misfortune, a species of illness, and not as a legitimate mode of enjoyment, or subject of ridicule.

It is true, that occasionally one of the drunken *samourai* (class entitled to wear two swords) will on meeting with foreigners, actuated by his early prejudices and military training, draw his sword, and make an attack, which would have been refrained from had he been sober. But such instances are exceedingly rare, and when they do occur it is still more rare that mischief is not prevented by his perhaps equally drunk but less quarrelsome companions. During a residence of more than two years in Japan I have frequently been with the Japanese of the better and more dangerous class, at their convivial meetings, sometimes alone, and although they have generally ended by getting tolerably drunk, I have never seen swords drawn, or any exhibition of ill-temper or malice. Twice in

the streets of the native cities I have seen drunken Japanese officers attempt to draw their swords upon foreigners, but in neither case did any ill-result follow, their friends interfering almost before the action could be noticed. Quarrels among themselves caused by drinking are exceedingly rare. As for other kinds of crime, I have yet to hear of the first instance of a connection between such and drunkenness.

Like all Eastern nations the Japanese are exceedingly temperate. Habitual drunkenness is almost unknown. At the general holidays, which occur about forty times a year, and at private family festivals, all the natives, men, women and children, drink more or less saki, but at other times they rarely touch it. Saki is brought out at the family festivals, is drunk with great ceremony at funerals, and on special occasions of jollity, but is rarely allowed to interfere with business or labor. Last month there was an unusually important *Matzri* (festival) at Yokohama, to the Goddess of Heaven, the ancestress of the Mikado dynasty. This holiday lasted for three days, during which it is safe to say that the entire native population of Yokohama was more or less intoxicated. The streets were crowded with processions and shouting bands of men with flushed faces, capering, singing and playing practical jokes. With all this drunkenness, there was not a single instance of assault, much less murder, reported. Comparing this result with that of a 4th of July in America, or with similar holidays in other countries, I cannot hesitate in declaring that not only is the comparative intoxication of this country less in degree than that of other nations, but that it differs in kind, leading to few or none of the evils to society which have caused the temperance movement at home.

Since the government has never recognized drinking as a cause of crime, or as a greater evil than any other excess, it has never been made the subject of official investigation, and there are therefore no official statistics.

I am sir, very respectfully yours,

J. H. KIDDER, A. M., M. D.,

Asst. Surgeon U. S. Navy.

C. O. SHEPARD, Esq., *U. S. Consul*, Tokel, Japan.

UNITED STATES OF AMERICA LEGATION, }
YOKOHAMA, JAPAN, June 20, 1870. }

DEAR SIR:—Your communication of the 23d of February, 1870, propounding the following inquiries, to wit:—

- 1st. "What are the chief intoxicating articles used in Japan?"
- 2d. "What amount of crime is produced by them, and their

effects on health and prosperity of the people?" and also, asking my opinion as to the relative amount of intoxication in this country, &c., is now before me.

In reply to question No. 1, my answer is Saki, a liquor brewed from rice.

In answer to the second question, having no statistics to guide me, I can only answer it relatively by saying: less crime resulting from intoxication occurs here than any other country I ever was in, and less evil effects upon the health and prosperity of the people from this cause is observable than in the United States.

This is not a country in which any statistics in regard to this matter are obtainable, but after receiving your letter, I conferred upon the subject with a number of gentlemen of long residence here, and close observation, and from them I learned that their convictions coincided with my own as already stated, and as follows, to wit: The free use of intoxicating drinks is allowed all classes of Japanese people by law, the original object of allowing which was to prevent their resorting to the use of opium as the Chinese do, and it succeeded, as opium is not used by this people. Secondly,—the people are rigidly and by birthright divided into castes, the upper class or Samourai commencing with the Emperor, concludes with the private soldier, all of whom constantly wear swords and never perform manual labor. The second class includes farmers, mechanics, merchants, and thus on down to Coolies, in the order here stated. They perform all the labor of the country, are not eligible to any office, and hold their lives and property by a very delicate thread that this upper class stand upon little ceremony in severing, if sufficient excuse is offered; hence this lower class, from sheer fear of offending some of the Samourai, and meeting with severe and summary punishment, are not addicted to drunkenness, in which condition they would be most liable to do or say something that would bring punishment upon them. Any member of the Samourai class, although but a private soldier, is eligible to any office in the gift of the Emperor, and generally all offices are filled by men promoted for their skill or wisdom. To be known to be addicted to drink, or even to be seen once intoxicated, would have the effect to seriously diminish the chances of one's promotion, and as they are generally an ambitious and aspiring people they avoid this evil in aid of their ambitions, and besides this as they rarely quarrel without fighting, and as all of them go constantly armed with most formidable weapons, they avoid drink as likely to produce fighting, and fighting with them means the death of one or the other of the antagonists. Thus sobriety is the rule and intoxi-

education the rare exception with this people. My Secretary, Mr. A. L. C. Portman, who has been a constant resident here now some ten years, and has mixed very much with all classes of the people, assures me that Japanese women make no use of intoxicating liquors at all, and that he has during his whole residence never seen but one Japanese woman under the influence of liquor. Regretting that I am unable to furnish you with any statistical information as requested, and apologizing for the meagreness of the information hereby given,

I remain, yours most truly,

C. E. DeLONG.

P. S. Since writing the foregoing I have met and conferred upon the subject with Doctor Hepburn, a missionary gentleman and a physician here of the highest repute, who has lived here a long time, keeps a dispensary, and has many Japanese patients, and from him I learn that drinking is much more frequent than I supposed amongst the Japanese, who as he says quietly drink at home very considerably, both men and women, but as the intoxicating qualities of Saki are only about equal to lager-bier, it is used almost as a beverage, and but little evil consequences comparatively speaking are produced by its use. This information I deem most reliable and therefore send it with my own views.

Yours, respectfully,

DeLONG.

AGENCY AND CONSULATE-GENERAL OF THE U. S. OF A. IN EGYPT, }
ALEXANDRIA, July 25, 1870. }

DEAR SIR :—Your queries in behalf of the State Board of Health, regarding the influence of intoxicating drinks on the health and prosperity of our people, addressed to me at Calcutta, have been received in Egypt, to which country my government was pleased to transfer me.

I will, however, cheerfully answer the questions to the extent of my ability.

1st. The chief intoxicating articles are, "arrack," champagnes and red wines.

This being a Mohammedan country, drunkenness is almost unknown, and confined entirely to the foreign Christians residing here.

2d. Crime is almost entirely committed by the foreign population, and altogether so when it is caused by drunkenness. Murder, theft, rape, burglary, forgery and other grave crimes are monopolized by the Greeks, Italians, French and other Christians resident in Alexandria and Cairo.

Of course, under these circumstances there can be no relative amount of intoxication between the two countries. In the United States and England, the capacity to hold a vast quantity of liquor is taught as one of the highest attributes of manhood. In this benighted land, to be drunk involves the most extreme social and religious disgrace. And while the teachings of the Prophet hold sway, there is no prospect of these infidels becoming civilized in that respect.

3d. There are no statistics of intoxication and crime in this country; the records from the Christian nations will therefore have to furnish warnings to the good people of the grand old Commonwealth of Massachusetts which in matter of temperance may proudly say she is almost Mohammedan.

I remain, with the highest respect, your obedient servant,
 GEORGE H. BUTLER.

CONSULATE OF THE U. S., ISLAND OF ZANZIBAR, }
 May 21, 1870. }

DEAR SIR:—I received on the 18th inst., your letter of February 23, 1870, asking information as to,—1st. What are the intoxicating articles used in Muscat? In several visits to that place I have never heard of or seen anything of the kind, but once, on which occasion a vessel arrived from Mauritius with about sixty casks of rum. At Zanzibar the Arabs drink German gin and French cognac of the vilest description, and the negroes cocoanut rum of their own manufacture. 2d. What amount of crime is produced by them, and their effects on the health and prosperity of the place?

As the religion of the people is Mahometan, which forbids the use of intoxicating drinks, those who use them do so in secret, taking care to confine their appetites within bounds so as to retain the outward respect of each other, and we only see drunkenness when English or American sailors are on shore here. No comparison therefore is possible between the two countries. I believe that intoxication seldom if ever, leads to crime in these dominions.

I am, sir, very respectfully yours,
 FRANCIS R. WEBB, *U. S. Consul*,

UNITED STATES CONSULATE, CAPE HAYTIEN, }
 July 1, 1870. }

DEAR SIR:—I have to acknowledge your circular of February 23, which reached me only on the 14th June, and I have now the pleasure to reply to it.

Before entering however upon the proposed questions, I find it necessary to make a few preliminary observations. Intoxication by ardent drinks and other narcotic drugs, alike with smoking, as a general vice, presupposes an advanced state of society, when men strive to forget the realities and hardships of life by over-exciting their nervous system. For, the proper use of drinks is, to quench thirst; and for this purpose, nature has afforded to man, one of her richest and most abundant gifts, the limpid, cooling and enticing draught of springs, wells and rivers, which abound nowhere more than in the West Indies.


The masses of pure African descent in Hayti are a semi-civilized race, of the simplest tastes and habits; their wants are few and amply provided for by the fertility of the soil, their undisputed property. As a general rule they have rather an abhorrence for strong drinks, to the use of which only habit and social intercourse lead. Living isolated in their mountain fastnesses, and in no or little contact with foreigners, nor even with the inhabitants of the ports, the habit of convivial meetings lacks encouragement.

To reply to query 1, the chief intoxicating drink of Hayti is cane-spirit, called here "Tafia." At the time of French colonial rule until Christophe, cane sirup was only used for the production of sugar; distilleries for the production of spirits were scarce. Since the independence of the island and the cessation of sugar boiling, most of the sirup goes to the distilleries (guldives), which were then established in districts favorable to that particular industry, and "tafia" became the general stimulant drink.

But the character of the masses and the paucity of the "guldives" over a vast area of inhabited plains and hills, the constant repetition of civil contests almost in every decennium, interrupting and ruining industrial enterprise, prevented the development of the propensity among the masses. The chief consumption remained confined at the seaport towns to sailors, foreigners and such Haytien half-breeds who had visited Europe and imported European habits. Under the late government of Salnave, the commodity became so scarce that a law was passed to import foreign rum, free of duty, I suppose under the then circumstances of the country, with very small results.

Query 2d. Hence there may be, though rarely, drunken frays between sailors and other habitual tipplers, but within my knowledge, I never heard of the committal of any serious crime by negroes in consequence of immoderate drinking.

Polydipsia and inebriety, as effects of a morbid state of health, such as hypochondriasis, hysteria, &c., are, in a country where



morals and sexual intercourse are unrestrained, almost unknown. On the other side, diseases consequent on immoderate use of ardent liquors, such as dropsy, scirrhus ventriculi, delirium tremens, consumption, are of rare occurrence among Creoles. The general health is favorable, when compared with other similarly constituted countries. Cholera never touched these shores, whilst desolating almost all the surrounding islands.

In spite of the political turbulence since the liberation from French rule, the people live at ease, and generally prosper. Statistical accounts in a country where the population are from time to time decimated by civil war, and an organized administration is impracticable, are out of question. I shall however endeavor to collect materials in my district, where I am only a short time located, for further communication.

I remain, very respectfully yours,

ABM. CROSSWELL, *U. S. Vice-Consul.*

LEGATION OF THE U. S. A., NICARAGUA, LEON, }
May 15, 1870. } .

DEAR SIR:—I regret that, in reply to your letter of February 23d last, received the 1st instant, I am unable to furnish you with any statistics or definite information on the interesting subject alluded to therein.

As in all Spanish-American countries, so in Nicaragua, the government has monopolized for itself the sale of strong liquors. The article almost exclusively used by the mass of the people is rum, made of sugar-cane, sold and drunk perfectly pure and unadulterated. The higher classes indulge in the vilest stuff imaginable, imported mostly from France as cognac, champagne, &c., &c.

There are remarkably few cases of drunkenness noticeable in public and among the lower classes, who drink rum, while, for good reasons, I always found it wise on occasion of banquets, dinner or other parties, both public and private, among the higher classes, to withdraw at an early hour. If the native rum, which seems but in exceptional cases to be indulged in to excess, has any injurious effect on the health and prosperity of the people, which I am rather inclined to doubt, it certainly is very insignificant.

During a residence of nearly seven years in Central America (Costa Rica and Nicaragua), I do not think that half a dozen of unfortunates, bent upon self-destruction by strong drinks, among the natives, have fallen under my observation.

I am most confident that the amount of intoxication in this coun-

try falls immensely short of that seen and not seen in our own land. Even here, I regret to say, our countrymen are by no means distinguished for sobriety.

I have heard it asserted, both in Costa Rica and here, that delirium tremens is never the consequence of excessive indulgence in rum, but will inevitably follow as soon as the rum-drinker turns to foreign, i. e., European and American strong liquors.

I have the honor, sir, to be your obedient servant,
C. N. RIOTTE.

U. S. CONSULATE, ST. CROIX, W. I., }
June 13, 1870. }

SIR:—Yours of February 23d has been received. In answer to your first question, I would inform you that the “chief intoxicating articles used in Santa Cruz,” are rum, brandy, wines and malt liquors, all of which, except the rum, are imported from Europe. The rum is manufactured here, and is the almost only intoxicating drink used by the laboring population. The higher classes only use wines and malt liquors, and brandy more than rum.

It is impossible for me to answer your second question with any degree of satisfaction, as there are no statistics on this subject published here. Crime of a serious character is very uncommon. Pilfering produces most of the tenants of our prisons, and I believe there is no country in the world where one is safer from assault and robbery than in the island of Santa Cruz. This results, doubtless, in some measure, from our isolated position and the difficulty of escape. “Rum-shops” are abundant, and rum is sold at them in any quantity down to one cent’s worth. Still I am of opinion that drunkenness is less common with the laboring classes than in the United States. An exhibition of it in the streets is certainly less common. This, however, may be owing in part to police regulations and the fear of arrest. I think the effect of the use of intoxicating drinks is more apparent among the higher classes. Wines and liquors are used at all social gatherings very freely, and by a considerable number of the people at all times too freely. That the effect is pernicious to health, and injurious to the prosperity of those who thus indulge their appetites, I know from personal observation. I do not think, however, any amount of crime is produced by the use of spirituous liquors. Upon the whole, I am inclined to the opinion that the use of intoxicating drinks is much more *universal* here than with us, and that intemperate drinking

is more common among the higher, and less common among the lower classes than in the United States.

I am, sir, with great respect, your obedient servant,

E. H. PERKINS, *U. S. Consul.*

TORONTO, ONTARIO, April 17th, 1870.

I have to acknowledge the receipt of your communication bearing date 23d February, 1870, and, in reply, briefly give you such information as seems to me pertinent to the subject you have under advisement.

In reply to your first inquiry, "*What are the chief intoxicating articles used in Canada?*" I answer, that brandy, gin, whiskey, sherry, champagne, together with the various kinds of ale and beer, make up, in the main, the list of "intoxicating articles" used in Canada.

In answer to your second inquiry, "*What amount of crime is produced by them, and their effects on health and prosperity of the people?*" I have to report that, in my judgment, founded on large observation, *ninety-eight per cent.* of all the crimes committed here grow out of the use of intoxicating drinks. In the police court of this city the daily arrests vary from five to twenty. I have very frequently visited the same, and I do not now recollect a single committal to have been ordered, or a fine imposed, since I came here, where the prisoner was a consistent temperance man or woman. Intemperance *almost invariably* lies at the bottom of all the crimes which swell the criminal calendar of this city and entire Province.

As to the relative amount of intoxication in Canada and that seen in the United States, I may say that it would be difficult to determine what ratio there was between the two countries, owing to the difference in the quality of the intoxicating drinks used. In Canada, as a general rule, liquors are cheaper and purer than in the States, and as a consequence more can be used with less apparent injurious effect here, than would be possible there.

Pure liquors do not affect the habitual drinker as do the vile compounds sold in such alarming quantities in the United States. There is a marked difference in the effect produced by pure and drugged liquors. In the one case, the effect is the reverse of the other. One using drugged liquors seems to be for the time in a state of frenzied insanity.

The general use of wines and liquors in Canada, as a social

custom, is in marked contrast to the growing abstinence in many of the leading families in the States.

Intemperance here, as is the case everywhere, breeds crime, and daily leads to the committal of monstrous wrongs. The subject you have in hand is one of very great importance to society the world over, and I am sincerely sorry that pressing duties will not permit me to more fully develop an inquiry almost boundless in its bearings.

Sympathizing most fully as I do in your researches, as set forth in the circular you forwarded me, I shall look with interest to the results of your labor. The social problems of the day are the great questions of the age, and he who succeeds in providing a practical remedy for the evils now threatening the future prosperity of our body politic, will earn for himself the commendation of all mankind.

Faithfully yours,

A. D. SHAW, *U. S. Consul.*

UNITED STATES CONSULATE, TRINIDAD DE CUBA, }
April 11, 1870. }

SIR:—On the ninth instant I had the honor to receive your communication dated February 23d, requesting information toward elucidating the subject of the “influence of intoxicating drinks on the health and prosperity of the people of the United States,” and I cheerfully give you the little information which I possess in behalf of a subject of so great an importance.

With regard to question 1st, “What are the chief intoxicating articles used in Trinidad or vicinity?” I would reply, that the usual intoxicating drink made use of here is called “aguardiente;” it is distilled from molasses, is sold at a cheap rate, and is made free use of, not only for drinking, but also for bathing.

This liquor, although used so freely as a drink by the poorer class of whites, and the blacks, yet I must in justice add, that notwithstanding its liberal use, it is very seldom that it is drank to excess, so much so, that it is an extremely rare thing to see a person intoxicated in the streets.

The cheap claret wine from Spain (principally from Catalonia) is made use of here very generally at meal times, but scarcely ever is drank to cause intoxication. Indeed, it is a fact which has often attracted my attention, that in a country where intoxicating drinks are to be had so cheaply as to be within the reach of every one, and I may say, in such general use, that so very few cases of drunkenness are seen. This, I conclude, is in part owing to the fact that an

habitual drunkard is looked upon by these people with disgust and contempt. One may be a gambler (and there are a hundred of them to one habitual drunkard), or anything else immoral and improper, and this will not deprive him of a respectable position in society, whilst to be a drunkard is almost an unpardonable sin.

With regard to question 2d, "What amount of crime is produced from the use of intoxicating drinks, and the effects on health and prosperity of the people?" would say, that really in this town, where I have resided for thirty years, the amount of crime proceeding directly from the use of intoxicating drinks is so small that I can safely say that it does not amount to one per cent. of the total of crimes from all causes. Consequently I may say that the "prosperity" of the inhabitants is scarcely affected, if at all, from the effects of intoxicating drinks. I would add that a large number of coolies have been imported into this island, and that they are much addicted to the use of opium; this is the cause of the death of many of the coolies, and also, under its influence, or from its effects, they commit many crimes, and I have no hesitation in saying that there are fifty deaths among the coolies from the effect of opium, to one amongst the creoles from that of intoxicating drinks.

With regard to the "relative amount of intoxication in this town compared to that seen in the United States," you may well infer from the foregoing that the latter country must suffer most lamentably from the comparison. It is impossible for me to remit any "official statistics of the amount of intoxication and crime resulting therefrom," as you request, as no such records have ever been kept here to my knowledge.

In conclusion, would say that I wish to be understood as referring to this city (Trinidad de Cuba) exclusively in the foregoing observations, and with my best wishes for your cause,

I remain, your obedient servant,

HORATIO FOX, *Consul*.

LEGATION OF THE UNITED STATES OF AMERICA, }
LIMA, PERU, May 22d, 1870. }

DEAR SIR:—I have the honor of acknowledging the receipt of your letter, dated the 23d of February last, inquiring, 1st, "What are the chief intoxicating articles used in Peru?" and

2d, "What amount of crime is produced by them, and their effects on health and prosperity of the people?"

In answer to the first question, I may briefly say that all kinds of European liquors and wines are used in Peru. To those may be

added "Italia" and "Pisco," Peruvian brandies, made from the grape, "Chicha," made from maize, and similar in taste and character to the beer in our whiskey distilleries after the fermentation.

The wines of the country are very fair, but still the higher classes mostly use foreign importations, and at their tables, Bordeaux, sherry, and on special occasions champagne, will be found.

Your second inquiry is more difficult to answer. As a people, the Peruvians are much more pacific than our own, and crime is not so common. After six years' residence in Lima, a city containing 180,000 inhabitants, I have only seen one assault and battery—only four or five homicides have been committed, and pickpockets are unknown. The newspapers also show that such occurrences are very rare.

The Peruvians are far less given to drunkenness than the people of the United States. Among gentlemen such offences are of rare occurrence, and foreigners certainly excel them in all such "gentlemanly vices."

As to the health of the people, I can only state that I believe the average age of adults in Lima far exceeds that in the United States. From appearances, it would not be difficult to find in Lima at least one hundred persons over one hundred years of age.

Temperance societies are unknown here, and all drink who have the means to pay for it. My impressions are, that the use of light wines, and "Chicha," in this climate, add to the cause of temperance and health, by banishing the stronger alcoholic beverages and giving tone to the stomach and circulation of the blood. Life here seems to me torpid, and stimulants necessary.

As there are no statistics of intoxication and crime, except as stated in the daily journals, I regret that my reply to your note, could not be more thorough and satisfactory.

I have the honor to be, your obedient servant,

ALVIN P. HOVEY,

*Envoy Extraordinary and Minister Plenipotentiary
of the United States of America to Peru.*

PARA, 23d May, 1870.

DEAR SIR:—I am in receipt of your communication of 23d Feb.; illness has prevented my replying to it sooner.

1st. The chief intoxicating article used in Brazil is "Cachaça," rum (made from the sugar cane).

2d. In the absence of statistics, it is impossible to give a satisfactory reply to your second interrogatory, but habitual intoxication

is rare in Brazil, and is, I may say (of course with individual exceptions), limited to the lowest class of the population. Even among these it cannot be said to be prevalent. The blacks will get drunk sometimes, but even among them the vice is not general. Our country population, the Sapuyos or civilized Indians, are as a rule temperate, but they will all get drunk on certain "festas" (Church holidays), when they gather from miles around at the district chapel.

You will observe that my observations apply more particularly to the Amazonian provinces, but I have resided in the south as well as in the north of Brazil, and with exception of the reference to the Sapuyo, a race found only on the Amazon, I believe they may be applicable to the country generally.

The word "bebado," drunkard, is a term of great reproach—in the cities, it is too often and too justly connected with the word "Inglez," and I am sorry to say that the national designation properly includes our own countrymen.

A great deal of porter and ale is consumed in the country, imported from England.

There is a festa held yearly at a chapel in the suburbs of this city; last year, on the principal night, when I think not less than from 10 to 15,000 people of all classes were assembled in the square, I passed through the crowd, and observing carefully, could not find one drunken man; nor was there any *row* nor any fight; later in the evening two drunken men appeared, both *respectable* foreigners.

With these exceptions, I do not remember to have seen more than two men (one a slave) drunk in the streets during the past six months.

You will see from these remarks that no comparison can be made as to the amount of intoxication in this country, and the extent of the national vice which so sadly disfigures our own.

Very respectfully, your obedient,

JAMES R. BOND, *United States Consul.*

It is proper that I should add, that the consumption of "cachaça" is large,—there is a grog-shop at almost every corner, not limited however to sale of liquors. How it happens that there are so many moderate drinkers and so little drunkenness I cannot tell.

CONSULATE OF THE UNITED STATES OF AMERICA, }
AT PERNAMBUCO, July 1st, 1870. }

DEAR SIR:—I have the honor to reply to your inquiries as far as I can gather them, viz:—

The chief intoxicating drink of this city and province, is the

liquor distilled from the sirup of sugar-cane, commonly called cané, or Brazil rum; there is quite a large quantity of it distilled in this province, but it is not all consumed here; a considerable quantity of it is exported to the south.

Most of the natives drink this, particularly the lower classes, as it is cheap, the cost being about forty cents per gallon. The crime that is produced from this drink, so far as I can learn, is very small. A person may travel through the streets of this city, for a week, and in fact the province (I have travelled much through it), and not see a Brazilian intoxicated.

Most of the crime that is committed through the influence of strong drink is by foreigners, principally seamen, and that only trifling cases of assault and battery.

Most of the foreigners that reside here are English, German and French. The English and Germans drink more or less beer, which is mostly imported from Europe. Many of the English drink brandy, and other intoxicating drinks, which has a bad effect in this hot climate, producing fever, and often death with the continued use of strong drink and exposure; although this is a healthy port, and clear of all contagious diseases, and has been since I came here, and for several years past, as I have learned.

I think the use of rum, or ardent spirits, is no detriment to the prosperity of the people, as they do not use it yet to excess, but the use of it is increasing, and may in time reach to bad results, as the manufacture of it increases yearly.

The most of the crime committed here is caused from jealousy and revenge, and done in cool blood; not intoxicated, hot and angry with spirit as in our country, but premeditated and cool; mostly of a dangerous character.

I have known several persons stabbed since I have been here, from jealousy, which is the cause of most of the capital crimes that are committed; not from drinking spirit but in the coolest manner, by attacking the party unsuspected and dealing a dangerous blow.

As to the amount of intoxication between this country and ours, there is no comparison, for here you seldom see a drunken man.

I came from the city of Philadelphia, where most of the crime is caused by intoxication, or the effects of it, and here none comparatively, so little that it caused me to make close observations as to its effects on the habits of the people. As for statistics of crime on account of drunkenness, I think there are none, at least in this city that I can find; if there is any crime from intoxication it is recorded from other causes.

I hope the above will be satisfactory, as it embraces most of the facts, as near as I can gather them from observations and statistics.

I am sir, with the greatest respect, your obdt. servant,

SAMUEL G. MOFFITT, *U. S. Consul.*

U. S. CONSULATE, SAN JUAN DEL SUR. Now at CORINTO, }
May 27th, 1870. }

DEAR SIR:—Yours of February 23d is received, and I cheerfully give you such answers to your questions as I am able. I should say, however, that my facilities are not good for getting accurate information on the subject in question, as my business confines me the greater part of the time at this port, a town of small population.

The *chief*, and almost the only intoxicating drink used by the *masses* of the people in this Republic is *new rum*, manufactured from cane molasses. It is a government monopoly, made by contract, at about forty-five cents per gallon, and sold by the government for \$2. From this it derives an important revenue. The wealthier classes use cheap brandy. Claret wine is used quite generally, and I think a considerable amount of other wines, among those who can afford it.

No *statistics* of crime can be obtained resulting from this or other causes, but my impression is that intoxication here gives about the same proclivity to vice as elsewhere.

There are *very* few people here who are strictly temperate and very few who can be called inebriates, but I am quite positive that there is far less intoxication here than in the United States, and vastly less evil resulting therefrom. My opportunities for *general* observation in neither country would qualify me for giving a reliable statement of the relative amounts.

I am sir, very respectfully yours,

RUFUS MEAD, *U. S. Consul.*

CONSULATE OF THE UNITED STATES OF AMERICA, }
TRIESTE, October 13th, 1870. }

DEAR SIR:—Some months since I had the honor to receive from you a circular letter requesting information upon the influence of intoxicating drinks on the health and prosperity of the people under my daily observation, your inquiries being given under two general heads, to which I will reply after a preliminary remark or two.

Trieste (proper) contains a population in round numbers of about 90,000 souls. It is not only the principal seat of commerce

on the Adriatic, but of a large manufacturing industry. It has extensive iron-works, large ship-building establishments, and a great number of coopers' and cabinet-makers' shops. The want of dock and wharf accommodations, and of machinery for the manipulations of its immense grain and lumber commerce compels the employment of a very large number of lighter-men and laborers, not needed in American ports. Again there are rarely less than a hundred vessels in port—not counting of course, fishing smacks and the like, and I have known the number to reach 430. The arrivals of sailing vessels in 1869 were in number 7,376, of which 1,725 were from ports outside the Adriatic; arrivals of steamships 1,719, more than two-thirds of which were from ports outside the Adriatic—mostly large vessels of 800 to 2,000 tons. We have, therefore, seldom less than 500, often 2,000 or more seamen in port. No English or American (Atlantic) sea-port has so large a number of laboring men in proportion to the whole population, as Trieste. As boarding-houses (in the American sense of the term) are unknown, the unmarried and a large proportion of the married men collect in the eating-houses for their supper, when the day's work is ended, and are thus exposed constantly to the temptation to indulge in strong drink.

The "liquoristas" scattered through the town to the number of seventy-eight, correspond to the old American "bar-rooms," except that they are not connected with the inns. They are independent shops and furnished in all degrees of elegance. All sorts of liquors and high-priced foreign wines are sold by the glass in those of the higher class, ordinary liquors only in the lowest, but no common wines or beer. How these liquoristas exist is a mystery to me, for in the many I pass daily, I seldom see more than three or four persons, and the gulping down of glass after glass of brandy, gin or rum is utterly unknown among the native population. The glasses used are exceedingly small, and the liquor, usually unmixed with water, is sipped slowly at intervals, as a gentleman with us takes his maraschino after dinner. Mixtures like "juleps," "cobblers," and the other wonders described by English tourists in the United States, are unknown.

The "Osterias," one hundred and eighteen in number, are the ordinary eating-houses of the middle and lower classes of the people. In them, as a rule, I believe without exception, no drink but wine is to be obtained; the light red and white wines from neighboring districts, drawn from the casks.

The "Trattonas" and "Birrarias," restaurants and beer-houses, rank higher than the last, and are in the main supported by the

mercantile class, the officers of the army and navy, and generally the Teutonic in contra-distinction to the Italian and Slavonic population. Beer is the principal beverage in these fifty-five establishments, though wines are also furnished, and the occasional demand for a small glass of cognac or other fine liquor is supplied.

In the fifty-four coffee-houses also, all the finer liquors and spirits are dispensed, but invariably in the smallest of "portions."

In the hotels are no bar-rooms, but the guest is supplied, at table or in his room, with whatever beverage, from beer to brandy, he may demand.

It will be seen from the above that no restraint whatever is imposed upon the purchase of spirituous liquors, except that in the licenses granted to the lower classes of eating-houses, the proprietors are deprived of the power of tempting to drunkenness by the sale of anything except wines or beer.

The following tables, drawn from the very exact records of the Chamber of Commerce, will give a fair view of the consumption of beer, wines and liquors by this population of 90,000. Everything of the kind that enters the city by sea or land is recorded in "centner," hundred weights.

YEARS.	Imports by sea and land of Alcohol and Spirits, Rum* excepted, cwt.	Exports, cwt.	Excess of Imports, cwt.	Imports of Rum, cwt.	Exports of Rum, cwt.	Excess of Exports, cwt.
1860, . . .	190,950	171,802	19,148	9,374	33,440	24,066
1861, . . .	163,829	140,515	23,314	12,224	29,946	17,722
1862, . . .	156,364	110,613	45,749	10,997	32,976	21,999
1863, . . .	159,150	139,260	19,890	2,657	33,367	30,680
1864, . . .	209,574	182,988	26,587	5,275	39,466	34,181
1865, . . .	199,079	171,060	28,019	4,225	39,476	35,251
1866, . . .	181,872	160,988	20,884	6,754	32,056	25,302
1867, . . .	179,890	163,805	16,085	2,668	31,636	28,968
1868, . . .	256,588	226,108	29,171	7,538	43,681	36,143
1869, . . .	274,239	224,230	46,431	1,340	60,982	59,642
	—	—	275,278	—	—	313,954
Excess of Export,						38,675

There are no distilleries in Trieste; making due allowance, therefore, for the ordinary consumption of alcohol in manufactures, the great excess of the export of the mixture here called "rum" over the import of the real article, reduces the amount of spirits used as

a beverage to an exceedingly small quantity. That is to say, statistics, also, prove that spirits are in no form a common drink of any class of people in this city.

Total Imports and Exports by Sea and Land.

YEARS.	WINE.			BEER.		
	Imports, cwt.	Exports, cwt.	Excess of Import,cwt.	Import by land, cwt.	Export by sea, cwt.	Excess of Import,cwt.
1860, . .	173,976	47,237	126,739	71,475	21,958	49,517
1861, . .	106,599	47,791	58,808	82,520	28,094	54,426
1862, . .	137,421	30,395	107,026	84,081	32,207	51,874
1863, . .	176,028	30,514	145,514	72,924	29,025	43,899
1864, . .	180,045	33,139	146,906	72,704	29,920	42,784
1865, . .	183,781	36,414	147,367	84,978	40,167	44,811
1866, . .	214,030	30,198	183,832	73,879	51,273	22,606
1867, . .	192,854	37,009	155,845	93,614	48,669	44,945
1868, . .	194,525	44,738	149,787	113,856	68,413	45,443
1869, . .	208,667	60,440	148,218	137,028	71,377	65,651

[N. B. The discrepancy in the beer statistics for 1866 is caused by the opening of a splendid new brewery, just back of the town, in the spring of that year, the product of which does not appear in the figures that season, except partly in the column of export.]

These tables and the preceding remarks afford a full answer to query 1 of your circular, viz.: that wines are the chief intoxicating article used in this part of Austria. So far as my observation extends, no person intoxicates himself on beer, and very few, if any, upon spirits.

As to the second question, "What amount of crime is produced by intoxicating liquors?" I have to report that no statistics bearing on this point have been kept at the police office, and that a police commissioner with whom I conversed on the subject is of opinion that the amount of crime directly traceable to the use of liquor is trifling, if any. The few drunken brawls, which arise in the course of the year, and cause arrests for assault and battery, are for the most part confined to the crews of *American* and *English* vessels.

The drinking of wine and beer is universal. Oil is used in cooking and at table in great quantity, but very little vinegar; and light, sour table wines are the corrective. From infancy to age they are the common beverage, but are generally, as by Homer's heroes, mixed with water.

As I have been home but once (1863), and then only for a period

of seven weeks, since 1858, I am not competent to offer an opinion upon the comparative amount of intoxication here and there. I can only say that at that time, the American bar-rooms in New York, Washington and Boston, so frequented by respectably dressed people, and especially young men evidently of the better classes of society, pouring down spirits of all sorts, caused me a feeling which I can only describe as one of horror.

Here in Trieste, on the evenings of Saturdays and holidays, one may see a pretty large number of the laboring class of people intoxicated, but they are always "jolly drunk," not "savage drunk,"—in my view a broad distinction. They make night hideous in the cheap eating-houses and occasionally in the streets, by the unearthly yelling which they suppose to be singing, and wordy wars are not infrequent,—though even in this a stranger easily mistakes—and at the moment he expects to see a blow, he hears a burst of laughter. Addison wrote 170 years ago of the Italian recitative—"I have often seen our audiences extremely mistaken as to what has been doing upon the stage, and expecting to see the hero knock down his messenger, when he has been asking him a question; or fancying that he quarrels with his friend, when he only bids him good-morrow." On Saturday and Sunday evenings the laboring men, often with wives and children, sup together, as before remarked, in the public house, drink wines at a cost of less than 60 cents (gold) per gallon, to various degrees of intoxication, reel home supported by wife or friend, sleep off the effects, and next morning go to work as usual. Getting savagely drunk and going home to abuse and beat wife and children, is something unknown here.

Turning to the better classes of society, I have to remark that no instance is known of a merchant, lawyer, physician, shop-keeper or master-mechanic, becoming an inebriate and gradually losing position, property and business, and sinking into a drunkard's grave. That is to say, among the native population; for there have been three or four instances of Englishmen becoming more or less confirmed sots. One remarkable case of a man who sank so low as to sell his wife's and children's clothing for spirits, who became a nuisance to the family into which he married, and to the police, who reeled about the streets, lay in the gutters, and at last died in the common hospital at Naples, may be mentioned. He was an American.

There are no official statistics of the "amount of intoxication and of crime resulting therefrom" obtainable for Trieste; but upon a comparison of my observations here during the last six years,

with my recollections of those made between 1840 and 1850 at Cambridge and Boston, I should consider it a most happy change could the spirit drinking of Boston be bartered for the wine and beer drinking of this city. As I rarely taste anything intoxicating, I am in so far a disinterested witness.

I am, sir, very respectfully, your obedient servant,
(Signed,) ALEXANDER W. THAYER, *U. S. Consul.*

N. B. I find an omission in connection with the tables, viz., that the "centner" of export is the hundred-weight of Vienna; that of import the hundred-weight of the customs. The former is twelve per centum greater than the latter.

The following interesting letter is from the venerable Dr. Christison of Edinburgh:—

EDINBURGH, 26 July, 1870.

DEAR SIR:—When your letter of 23d February arrived here, requesting information about drunkenness in Scotland, I was confined by illness, and for some weeks in order to keep my University work going it was necessary for me to take great care by avoiding and postponing as much as possible of my other rather manifold duties. Thus it happened that I had to delay replying to your letter, until my undischarged debt to you has been brought up before me by the accidental discovery of the letter, and an unfinished answer, this morning. I fear the information I have to give you may be too late for any practical use you might have intended to put it to. But nevertheless I must not let you go on supposing, as you were well entitled to do, that I have been utterly regardless of your request.

I have several times bethought me how I could best give you a clear idea of the extent and evil effects of excess in the use of stimulants among my fellow-countrymen. The conclusion I have come to is to discard the favorite statistical method of inquiry among modern enthusiasts, as being full of fallacy, and apt to lead to dangerous and blundering practical conclusions. I am sure that you and your friends of the Massachusetts Board of Health will come much nearer the truth of things, if I tell you the general result of the observation of a long life, during which my attention has been seldom long withdrawn from the evils of drunkenness in various branches of the population of Scotland. There are really no statistical returns on the subject which are worth their cost in paper and ink.

In the first place, you ask "What is the chief intoxicating liquor used in Scotland?" The foremost is whiskey; the next is whiskey; the third is still whiskey; and any other is "nowhere," in racing phraseology. When the vice of drunkenness commences in any one of the middle or upper walks of life, wine may set it agoing; but that vehicle is soon changed to brandy, or to whiskey. Among the working classes there is no other from first to last than whiskey. Beer, a common intoxicating liquor among Englishmen, is not in use as such in Scotland. In the middle and upper ranks it is very widely used in moderation as a beverage during dinner, when wine is not taken. Scottish workmen unfortunately use it extremely little in that way, but, if they take any stimulant dietetically, it is whiskey; and hence the passage to excess is too easy. I do not recollect in fact to have ever seen a beer-drunk Scotsman but once; and that was an unfortunate gentleman of high reputation in a learned profession, who gradually fell into "rambles" of continuous drinking, and who, on one of these occasions, when the ladies of his house in the country had carefully locked up every bottle of strong drink they could think of, ferreted out, and got drunk upon, nine bottles of the smallest of small beer.

During last century the habit of frequent and extreme intoxication prevailed very much in all ranks of life. When one regards indeed what has been handed down of the correlative practices of the day, it is scarcely possible to avoid the conclusion that the upper and middle ranks, and even the educated and professional in the community carried off the palm in prowess as well as in frequency of indulgence. The close of last, and beginning of the present century saw a gradual change set in for the better. But even in my young days, when I began to go into company, about 1820, drunkenness in good society was far from uncommon. Almost any party of gentlemen, left in the dining-room, according to the fashion of the day, by the ladies, would rejoin them in the drawing-room with two, three or more much flustered, or drop one or two in the lobby incapable of showing face upstairs. But a rapid reform took place, and for a long time past any sign of alcoholic excitement in the drawing-room after dinner would lead to remark, and displeasure, and to quiet measures for withdrawing the offender. Cases of gross intoxication do occur certainly. But these are cases of the passion of drinking, "oinomania," or, in plain English, insane "drunkenism." There is thus a vast improvement in the habits of good society in Scotland, in the use of stimulants, during the last fifty years.

But I grieve to say that there is far from a similar improvement in the working classes. I am certain that proportionally drunken-

ness is more frequent there than it was. I cannot give you statistical proof. I would not give a rush for any such proof that may be offered me on one side or the other. But I can give you the result of my observation on the street and country roads. For, when I was a young man, and indeed till about thirty years ago, it was a very rare thing to meet a working man, either in town or country, who was drunk until the evening, after his work for the day was over; but for some time past such cases may be seen frequently at all hours of the day, and especially between one and two o'clock, which is their interval of work for dinner. I first observed this curious change, and mentioned my observation to various friends at the time who confirmed it, when about twenty-five or thirty years ago a great reduction was made in the excise duty on spirits. Within a few years the very high duty was restored, indeed was made greater than ever in Scotland; but there has been no improvement effected thereby in the appearance of things in our streets. Great exertions have been made by the educated classes to cure this fearful malady; and I must not say anything to undervalue their exertions in establishing temperance societies, and total-abstaining clubs. But I doubt whether many drunkards have thus been permanently reformed, and of the many guiltless who join these associations in youth, it may be a question whether any material number would have fallen victims to the vice if unprotected by the pledge, simply because a preponderating mass of the population have no natural tendency to fall in this way.

You also ask "what amount of crime is produced by the abuse of stimulating liquors?" When I was professor of medical jurisprudence for ten years, and for ten years more during which I kept up my connection with criminal trials as a crown referee and witness, I had ample occasion to verify the statement made by our procurators-fiscal, sheriffs, and public prosecutors,—that three-fourths of crimes against the person are more or less connected with drunkenness, and very many owing to that cause alone.

Lastly, you ask "what are the effects of the abuse of alcoholics on the health and prosperity of the people?" Here however two questions are embraced in one. I shall answer only that which relates to the health of the community. But if the vice of drunkenness damages the health of the people, and accounts for even only one-half of the cases of crime against the person, I imagine it will be unnecessary to answer the second branch of your third question,— "what is the effect of the abuse of alcoholics on the prosperity of the people?"

The influence of the vice of drunkenness on the health was

brought very early under my notice, in consequence of my being for very many years, and from a very early age, a medical officer of our infirmary, at a time when various epidemics prevailed; and, as professor of *materia medica*, I have had time to methodize my views on this subject as a branch of the action of alcoholics, in relation both to diet, and to medicines proper. Thus, in the first place, I recognize certain diseases which originate in the vice of drunkenness alone, which are delirium tremens, cirrhosis of the liver, many cases of Bright's disease of the kidneys, and dipsomania or insane drunkenism. Then I recognize many other diseases in regard to which excess in alcoholics acts as a powerful predisposing cause, such as gout, gravel, aneurism, paralysis, apoplexy, epilepsy, cystitis, premature incontinence of urine, erysipelas, spreading cellular inflammation, tendency of wounds and sores to gangrene. Next, I recognize as a wide-spread result of habitual excess, an inability of the constitution to resist the attack of diseases at large. And lastly, I recognize a greater inability, than in the sober, to sustain the treatment which is necessary or most serviceable in diseases generally. If all these ways of influencing mortality be taken into account, it is evident that the sum total must be very great indeed, although it may be impossible to express it numerically. How can we ever hope to express numerically the influence of drunkenness in aggravating the mortality from fevers, cholera, dysentery, and other zymotics? How much more difficult, when the question is with apoplexy and the long catalogue of other diseases of which the vice is the predisposing cause? No hospital physician, however, of long experience can doubt for a moment the enormous effect of habits of drunkenness in increasing one way and another hospital mortality,—that is, the mortality of the working classes. Details on this head would lead me to write a book, in place of a letter. But let me conclude with one illustrative fact. I have had a fearful amount of experience of continued fever in our infirmary during many an epidemic, and in all my experience I have only once known an intemperate man of forty or upwards recover. He was the *exceptio quæ firmat regulam*.

I will gladly learn what you think of all this. But remember I am not one of those who would deprive the world of alcoholics, for the sake of those who abuse them; I am not one of those smug philanthropists, who would ask a government “to permit me to prevent you from having your grog.” If a man, in face of universally admitted consequences, will insist on habitually getting drunk,—*quid facias illi? Jubeas miserum esse, libenter quatenus id facit.*

I am yours most faithfully,

D. R. CHRISTISON.

UNITED STATES CONSULATE, ROTTERDAM, }
Nov. 9th, 1870. }

SIR:—I have the honor to transmit to you the enclosed documents which I have just received after so long a delay. In forwarding them to me, the secretary of the society* explained that delay by stating that my letter was only received after the preceding trimestrial meeting, and that it had to be referred to the following meeting.

The within statement is an extract of the letter which accompanied the pamphlet.

I shall always be very happy to do anything for which you may have an opportunity of applying to this Consulate.

Very respectfully yours,

(Signed) FREDERICK SCHÜTZ, *U. S. Consul.*

In this country gin is the beverage of the people, and to such an extent as to create a general anxiety about the future of a nation committing excesses in that beverage, condemned as well for moral as physical and economical reasons.

The minister of finances estimated the revenue on gin for 1871 at 14,200,000 florins, gin paying 53 florins duty per hectolitre of fifty degrees strength. The quantity used for technical or other purposes is hardly anything.

Calculating the population of the Netherlands at three and a half millions, and taking off three-fourths for women, children and very old people, show that one-fourth of the whole population furnishes a tax of more than 14 millions of guilders, and undoubtedly the same amount to inn-keepers, etc.

It is calculated that twenty-eight-thirtieths millions of florins are spent in gin by the people.

We believe that every drop of alcohol is injurious and the beginning of wilful poisoning, as it is incessantly proclaimed by our renowned oculist, Professor Donders; and that this kind of alcohol, obtained by distilling, does not mix itself with the blood, but runs through all blood vessels, acting injuriously on the brain and impairing the best human faculties down to second and third generations.

The investigations of the society have led to the result that the number of drinkers of gin has considerably decreased, that the use of that beverage by higher and middle classes is considered indecent, and that the people are coming to the conviction that, in

* Société Néerlandaise pour l'abolition des boissons fortes.

the interest of peace and public order, intoxicating liquors must be abolished.

By statistics it is shown that fifteen-sixteenths of the crimes committed result from the use of gin.

HIOJO, JAPAN, Oct. 17th, 1870.

DEAR SIR:—Your letter of the 23d of February was handed not long since by Mr. Stewart, the American Consul, with the request that I should answer it.

The chief intoxicating drinks used in Japan are a simple fermented liquor from rice, called Saki, and a distilled liquor called Shochin.

In the island of Kinsin, wine is made from grapes.

There is a great deal of saki consumed in Japan; but probably less drunkenness seen on the streets, at least, than in America; and whether there is really less drunkenness it is hard to say. The opinion of the best informed men is, that most of the drinking is done at home, and hence not noticed by casual observers, but that there is more drinking to excess here than at home.

With reference to the amount of crime traceable to the use of intoxicating liquors, there are no statistics at my disposal, and the observation of the most favored foreigners has been so limited that any opinion would be of no value. I have written to the authorities on the subject, but have as yet received no answer; if one arrives with any information on the subject, I shall be most happy to forward it to you.

Yours, very respectfully,

D. C. GREENE.

CONCORD, MASS., Dec. 17th, 1870.

DEAR SIR:—I have just received through Mr. Brewer, your circular of February 10, an answer to which, I fear, I shall not be able to make very satisfactory from the imperfect data I have at hand. Had I been consulted in season, I would have advised the addressing your circular either to Attorney-General Stephen H. Phillips, or to Dr. G. P. Judd of Honolulu, or to some other resident physician. Mr. Phillips is now on a visit to his friends in Salem, Mass.

The amount of crime caused by the use of alcoholic drinks can only be determined by the records of police courts, of which I have no reports.

The answer to your first question, "what are the chief intoxicating articles used in the Sandwich Islands?" may be found in the Honolulu custom-house returns, from which I copy as follows:—

Invoice Values.

	1867.	1868.	1869.
Importation of English "ale and porter" and German "beer," chiefly lager beer, . . .	\$38,526 18	\$38,073 70	\$20,246 16
Importation of "spirits" (consisting of American whiskey, French brandies, Holland gin and West India rum), . . .	23,288 70	85,907 24	33,870 98
Importation of "wines" (mostly French and German, with a small proportion of California), . .	8,451 37	12,030 60	15,801 46

Spirits taken out of Bond for consumption in 1869.

Rum, 396 gals.	Port, 201 gals.
Gin, 5,239 "	Bitters, 177 "
Brandy, 4,537 "	Sundries, 328 "
Whiskey, 4,177 "	
Alcohol, 799 "	17,016 gals.
Sherry, 1,162 "	

Estimated revenue from duties on spirits and wines for two years, 1870-1 and 1871-2, \$85,000.*

The distillation of spirits in the Hawaiian Islands is prohibited by law. Illicit distillation, however, has been carried on to a considerable extent; and the government has never been able to entirely suppress it. The amount of the domestic article is insignificant when compared with the amount imported. It is the product of a native root called "Ti" root which is rich in saccharine matter. The traffic in "Ava," also a native root, is legalized, used chiefly by natives, as a medicine ostensibly, but really for no other than intoxicating purposes. With its narcotic stimulant properties and its action on the skin, you are doubtless familiar.

* *Vide* Ministerial Report.—Duty on spirits, \$2.50 per gallon. Duty on wines, 50 cents per gallon.

The traffic in opium is legalized, and its consumption, though chiefly confined to the Chinese, is beginning to find favor with the native population. A Chinese merchant paid, about two years since \$9,000 for the exclusive right of the trade in opium in the Hawaiian Islands.

Besides the product of the "Ti" root (a spirit of about the strength of American whiskey), the natives prepare a stimulating beverage by the fermentation of sweet potatoes and of molasses when they can obtain it; not openly, however, as this also is unlawful.

The native population of the islands is about 55,000.

White foreign population does not exceed 4,000.

Chinese population about 2,000.

Of the foreign white population, not more than one-half are addicted to the use of intoxicating drinks. Very little, if any, is taken by the Chinese. And as the sale of all intoxicating beverages to natives is prohibited by law, enforced with severe penalties, the consumption by this class of the population is comparatively trifling.

The amount of alcoholic drinks imported into the Hawaiian Islands appears large when compared with the whole number of consumers, probably not exceeding two or at most three thousand. But by far the largest consumption is, no doubt, to be placed to the account of the great number of seamen annually visiting the different ports of the islands.

Your circular calls for the "relative amount of intoxication" (at the Sandwich Islands) and "that seen in the United States." But having resided abroad for thirty years past I have had but little opportunity of observation as it respects the relative or actual consumption of spirits in this country. And I have therefore given the total amount of the consumption at the Sandwich Islands with the number of consumers as nearly as can be ascertained, leaving the comparison with the United States to be made by those better informed than myself. As I am in doubt also as to the limitations (if any) under which the word "intoxication" is to be taken in the circular, I have preferred giving the *facts*, leaving the *effects* to be inferred.

In regard to the "effects" however "of alcoholic beverages upon the health and prosperity of the people" of the Hawaiian Islands, instead of my own "opinion" I am able to give you what will have far more weight—the views of the Hawaiian government—which may be inferred by its course of legislation in respect to alcoholic beverages during a period of fifty years. The importation of in-

toxicating beverages into the Hawaiian Islands, except for medicinal use, was some years subsequently to the arrival of the American missionaries, 1820, absolutely prohibited, and this prohibition continued in force till 1839, when (in July of that year) it is well known that the king of the Sandwich Islands, in order to avert the threatened bombardment of his capital by the French frigate "Artimise," signed a treaty, urged at the cannon's mouth by Capt. La Place, admitting French brandies ("eaux-de-vie") at a duty not exceeding five per cent. Subsequently other nations in treaty with the Sandwich Islands claimed the same privilege by the "parity clause." For several years subsequent to the visit of the "Artimise," the French consul and other interested persons, made strenuous efforts, though without success, to induce the Hawaiian Legislature to repeal the law prohibiting the sale of intoxicating drinks to natives. The French consul insisted that the law contravened the spirit of the treaty, but this pretension was finally abandoned.

In contrast with the treatment of the Hawaiian Islands by the French, we are reminded of the very different policy they found it necessary to adopt for the government of Tahaite, of which they took possession in 1839. Very soon after its occupation by the French, intoxicating beverages were classed with the contrabands, and the prohibition has been continued to the present time.

With more time, I might have made my answer more full and direct to the points of your circular, but Mr. Brewer informed me that you desired a reply without delay.

Very truly yours,

R. W. WOOD.

UTRECHT, December 22, 1870.

DEAR SIR:—The honorable Mr. J. J. Van Osteyee asked the favor of me to answer your favor of February 23, and so I have the honor to inform you, that the principal strong drinks which are consumed in the Netherlands are, Genevee, which is made out of corn, and used principally by the poorer classes, whilst the wealthier folks drink punch and different strong liquors.

We have in the Netherlands for the last twenty-five years a society, which does not work strictly for temperance, whose limits are difficult to define, but whose aim is to abolish the consumption of strong drinks, which, owing to the misery they produce, can be called a canker which destroys the prosperity of the people. Spread out over different sections of the country, the society, which counts

already several thousand members and increases always more and more, endeavors to persuade the people with the help of tracts and public meetings, what awful consequences arise from the abuse of these drinks, and although it has done a great deal of good in that direction, the members of the society giving good example by words and deeds, it waits always for severe measures on the part of the government.

Concerning your second question with regard to the consequences which these hurtful drinks exercise upon the health and prosperity of the people, the best answer will be the statement of our two most renowned medical professors, which was accompanied by the signatures of more than six hundred physicians throughout the Netherlands, of whom twenty-two live in our city, the contents of which statement is as follows :—

The undersigned physicians will sustain as much as possible the members of the *Nederlandish Society* for abolition of the consumption of strong drinks in their efforts in this behalf, and will work to remove the wide-spread prejudice as to the usefulness of the moderate use of strong drinks, and in consequence consider it their duty to give the following explanations as to the influence of strong drinks on the human body :

1. The moderate use of strong drinks is always unhealthy, even when the body is in healthy condition ; it does not do any good to the digestion, but even interferes with that process, for strong drinks can only temporarily increase the feeling of hunger, but not in favor of digestion, after which strong reaction must follow, and evils which are usually attributed to other causes, but often result from the habitual use with moderate drinkers.

2. The assertions, that intoxicating drinks used moderately, are naturally innocent means of cheering up, that they are useful in severe colds, or that they are with laboring men equivalents for sufficient nourishment, or useful in misty and humid air, or for people obliged to work in the water, or a protection against contagious diseases, are without any foundation, and contradictory to experience and to human reason, and the habitual use of the same has therefore an unhealthy effect, and an influence unlike what people expect from them.

3. The habitual use of strong drinks works most perniciously on all diseases and especially on consumption.

4. Regarded as the usual drink of all classes, they are not only improper on account of the above reasons, but also against moral development and material prosperity in such measure, as to be considered and to be stamped as the greatest underminers of the actual welfare of mankind.

(Signed)

C. B. TILAMUS,

P. U. SWINGAR,

Professors.

AMSTERDAM, March 19, 1846

In spite of this concise explanation, which was printed and distributed among the people and of all the efforts which the society uses, to work against the abuse in the consumption of strong drinks, the number of those, who are the slaves of this evil and subject to the consequences arising from the same, is still very great.

It can be said according to a source based on an eighteen years' experience, that the number of misdeeds committed under the influence of intoxication amounts to more than seventy-five to eighty per cent. I should be glad if these lines were satisfactory to your philanthropic intentions.

The delay in answering your favor is due to the lack of time in consequence of the same being taken up by my profession, I being principal teacher (superintendent) of the public schools.

Hoping that you will excuse the delay, I wish that you may work for our principles in your industrial country on the other side of the Atlantic, and that you may be able to contribute something towards the abolition of the mischievous drinking, in order that your fellow-citizens may become temperate, economical and industrious members of your republic, striving for perfection.

I have the honor to be with high esteem, very respectfully yours,
J. VISSCHER, *Chairman for the Department of Utrecht,*
of the Nederlandish Society for the Abolition of Strong Drinks.

BOSTON, January 29, 1871.

DEAR SIR:—The chief intoxicating articles used in Panama and Darien are annisette, cocoa-nut milk, wine from the wine-palm, a drink made from bananas and plantains, and a milky-looking liquid made only by the Sassardi-Morti Indians at Darien.

The annisette is brought wholly from Cartagena or Santa Marta, and is not made by the Indians. A little over a thimbleful will intoxicate any person not used to it, and none can bear more than an ordinary sized wine-glass full. It is nearly colorless, though slightly tinged with violet. It is said to be very injurious in its effects, few constitutions being able to bear constant use of it but a few years, or in some cases, months.

Cocoa-nut milk is made by covering half ripe nuts with a few inches of sand on the seashore, just above high tide, and leaving them for about six weeks. In this length of time the milk ferments and becomes as thick as cream, and next to annisette (or the European drink, aguadente), is the most intoxicating drink used by the natives. As it will not keep, the Indians as a general rule have their stock of buried cocoa-nuts, which they use as they want.

The wine made from the wine-palm is produced by squeezing the fruit in a press similar to the sorghum presses used in the West. The Indians make considerable quantities of it, and use it extensively in their households. It is only a moderate kind of stimulant, I believe, and seemingly not injurious when used moderately.

The drink made from bananas and plantains is quite similar to the cocoa-nut milk, though not nearly so powerful in its effects. There does not seem to be a great quantity of it used, from the fact I suppose of the cocoa-nut milk being easier to manufacture; but the Indians appear to drink it with great relish whenever they can obtain it.

The milky-looking liquid is manufactured by the Sassardi-Morti Indians principally; it may be by the others also, but Sassardi is the only place where I have ever seen it. Its composition is wholly unknown to me, but I imagine it has several component parts. It is not very strong, and is said by those who have tasted it to be a very pleasant acid drink, little stronger, if any, than cider.

The amount of crime produced by the use of the aforesaid drinks is a thing impossible to ascertain, but I judge not nearly so much as with white people under the same circumstances.

The relative amount of intoxication in Panama and Darien (among the Indians) is much less than has been commonly believed. Of course there are certain ones among them that are drunkards, but as a general rule, they are a much more temperate set than the whites. One circumstance was noticeable everywhere,—the less the civilization, the less the intoxication. At San Blas (Carti), where the Indians are far more advanced in civilization than at Caledonia Bay, or the Atrato, the amount of intoxication was fully two hundred per cent. more. But even there the number of drunken Indians in the little community was far less, I should judge, than it is in correspondingly large towns in the United States.

Respectfully yours,

E. W. BOWDITCH,

Late Mineralogist Darien Expedition of 1870.

MORTALITY OF THE CITY OF BOSTON
I n 1870.

MORTALITY OF THE CITY OF BOSTON IN 1870.

The mortality of a great city like Boston is usually expressed by a death-rate applied to the whole population. Sometimes the death-rate can be given by wards, but such divisions of territory are unsatisfactory for sanitary comparison. A portion of a ward may be good and another portion obviously bad in this respect. Ward six illustrates the difference. One side of Beacon Hill is made up of the very best, and the other side of the very worst houses; yet both are included in the same ward lines. It is desirable to be able to compare the death-rate in certain sections of Boston which are marked by various distinctions which may be supposed to influence the duration of life. With this view the city has been divided into twenty-four *Health Districts*, which are represented on the accompanying map. They are numbered from twenty to forty-three to avoid all chance of their being confounded with wards.

The "new land," or land reclaimed from the sea by filling with earth, is represented on the map by a dark gray tint. It will be seen that it includes already as much territory as was comprised in the peninsula of old Boston. The process of "filling," commenced in the last century, is still going on.

A word of caution may be given with regard to the fair interpretation to be put on results thus reached. Every one will of course see that there are many considerations relating to the general circumstances of the inhabitants to be weighed before a judgment can be formed as to the salubrity of "made land." The new land of Rochester and Genesee Streets is not necessarily chargeable with the high death-rate of that section, for it is quite equalled by the death-rate of the original land of the North End. Neither must the new land of the Back Bay be

credited with the low death-rate of that region, since the original land of the Highlands (District 41) is equally exempt from mortality. Another consideration, less obvious, is equally important to remember. There are large sections in which the number of servants nearly equals the number of persons of all ages in the families employing them. These domestics do not have their own children with them, and in case of severe illness, preceding death, they very often go to other places.

District No. 20 is East Boston.

District No. 21 is ward two, or the North End east of Haverhill and Blackstone Streets. A large part is made up of warehouses. Streets narrow. Inhabitants chiefly Irish.

District No. 22 is the portion of ward three; east of Poplar Street. It includes the streets on either side of Leverett Street, and a portion of the old "mill pond."

District No. 23 is a district of which the Massachusetts Hospital is the centre, and includes the north side of Beacon Hill. It contains a large proportion of all the colored inhabitants of the city.

District No. 24 is that portion of ward four, enclosed by Hanover, Court and Green Streets. Portland Street runs through the middle of this district. It includes most of the old "mill pond."

District No. 25 takes the rest of ward four.

District No. 26 is ward five.

District No. 27 is the south side of Beacon Hill, from Revere Street to the Common, and from the State House to Charles Street. It also includes a small territory on the north side of Beacon Hill, on either side of Hancock Street. It is nearly all original soil. The inhabitants are almost exclusively American.

District No. 28 is all "made land." It extends from Commonwealth Avenue to Charles River, and also includes the territory between Charles Street and the river, down as far as Cambridge Bridge. Inhabitants almost exclusively American.

District No. 29 is the portion of ward seven on the Old-Boston side of the channel. It is all "South Cove" land, reclaimed from the sea. Inhabitants chiefly Irish and German.

District No. 30 is the northern half of South Boston. A very large proportion of the inhabitants are Irish.

District No. 31 is ward eight. Its centre is about the cor

ner of Hollis and Washington Streets. It includes a portion of "South Cove" made land. A mixed population of Americans, Irish, Germans, and a good many Jews.

District No. 32 is that part of ward nine which lies west of Berkeley Street and Columbus Avenue. It is all made land, and is occupied almost exclusively by Americans.

District No. 33 is the "Church Street District." Many Jews live in this region. It is nearly all "made land."

District No. 34 is the "Suffolk Street District." Nearly all "made land."

District No. 35 is ward ten, west of Dover Street. More than half is "made land."

District No. 36 is ward eleven, east of Northampton Street.

District No. 37 takes the rest of ward eleven, and the portion of ward fourteen north and east of Washington Street. It includes the sunken Ruggles Street territory which the health authorities of Boston have suffered to be covered with expensive houses in 1870.

District No. 38 is the southern half of South Boston, including Washington Village, and (together with No. 39) the low, marshy region on the borders of the South Bay, referred to in the "Report on Flats and Water Areas," presented to the last Legislature.

District No. 39 is ward thirteen. Like the preceding district a large portion is so low as to make drainage difficult if not impossible. It is being occupied, however, by tenement and other houses, in violation of the law relating to "wet and spongy lands."

District No. 40 is ward fourteen, south and west of Washington Street, and including Mount Pleasant.

District No. 41 is Roxbury Highlands, or the portion of ward fifteen, south of Washington Street.

District No. 42 is the portion of ward fifteen, north of Washington Street. It includes the upper part of Tremont Street, the breweries, bone-boiling establishments, and what is known as "Grab Village." A mixed population of Irish, Germans and Americans.

District No. 43 is Dorchester, extending south to Neponset River, and including territory of great extent, but (as compared with old Boston) sparsely peopled.

The deaths and their causes in each of these districts have been obtained through the kindness of Mr. Apollonio, the City Registrar, by whom they are always recorded with great fidelity. He has allowed the State Board of Health every opportunity to examine the returns.

The population of the Districts has been obtained from the enumerators engaged in making the census of 1870. Application was made to the United States authorities at Washington, for permission to employ these officers in noting on the margin of their returns the facts we required. This was freely given, and by the kind co-operation of Gen. Andrews, U. S. Marshal, we have been enabled to obtain such information as was needed to carry out the original design.

The facts thus collected have been arranged in such manner as to show the comparative prevalence of each of the most prominent causes of death in all parts of Boston.

The following tables, by which this result is reached, have been prepared, since the close of the year to which they refer, by Dr. Frank W. Draper of Boston.

Analysis of the Mortality of Boston in 1870; showing the number of deaths from various causes, and at various ages, in each of Twenty-Four Districts.

HEALTH DISTRICT.	SCARLATINA.				MEASLES.				SMALLPOX.				CROUP AND DIPHTHERIA.				TYPHOID FEVER.			
	Under 1 year	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20, . . .	5	26	14	45	1	-	-	1	-	-	2	2	2	13	4	19	-	3	21	24
21, . . .	3	8	-	11	3	14	1	18	-	-	2	2	3	8	2	13	-	3	18	21
22, . . .	1	3	1	5	-	-	-	-	-	-	3	3	-	2	-	2	-	-	8	8
23, . . .	-	1	3	4	-	2	1	3	-	-	2	2	1	2	-	3	-	-	8	8
24, . . .	-	1	-	1	1	-	-	1	-	-	1	1	-	2	-	2	-	-	3	3
25, . . .	-	1	1	2	-	-	1	1	-	-	1	1	-	-	-	-	-	-	2	2
26, . . .	-	3	-	3	-	2	1	3	-	-	1	1	1	6	-	7	-	2	11	13
27, . . .	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	3	3
28, . . .	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
29, . . .	1	4	1	6	1	2	1	4	-	-	-	-	-	3	-	3	-	1	3	4
30, . . .	5	13	9	27	4	8	2	14	-	-	3	3	5	13	3	21	-	1	10	11

Analysis of the Mortality of Boston—Continued.

HEALTH DISTRICT.	DIARRHEA AND DYSENTERY.				CHOLERA INFANTUM.				CONSUMPTION.				TUBERCULAR MENINGITIS.			
	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20,	11	6	6	23	30	5	-	35	3	2	66	71	3	2	-	5
21,	13	9	7	29	55	19	-	74	2	5	97	104	1	2	-	3
22,	3	1	5	9	11	4	-	15	1	-	51	52	-	-	-	-
23,	7	1	9	17	15	5	-	20	1	-	51	52	2	2	-	4
24,	5	-	2	7	17	1	-	18	2	2	15	19	-	1	-	1
25,	-	-	4	4	2	-	-	2	-	-	4	4	-	-	-	-
26,	3	5	2	10	13	6	-	19	2	1	54	57	1	1	-	2
27,	-	-	2	2	1	-	-	1	-	-	9	9	1	-	-	1
28,	-	-	-	-	1	-	-	1	-	-	4	4	-	-	-	-
29,	8	2	3	13	23	7	-	30	2	2	41	45	-	-	-	-
30,	19	4	9	32	75	22	-	97	2	5	140	147	4	4	1	9
31,	2	-	7	9	10	2	-	12	-	1	40	41	-	-	-	-

32,	.	.	1	2	-	3	3	-	-	8	15	26	847	888	19	21	1	-	-
33,	.	.	1	-	-	1	1	1	-	2	-	1	15	16	-	-	-	-	-
34,	.	.	4	2	1	7	16	4	-	20	-	2	21	28	-	1	-	-	1
35,	.	.	1	2	8	6	14	1	-	15	-	1	39	40	1	-	-	-	1
36,	.	.	1	1	2	4	3	-	-	8	-	-	21	21	-	1	-	-	1
37,	.	.	8	3	2	8	16	6	-	22	-	2	38	40	2	1	-	-	8
38,	.	.	1	-	2	3	18	2	-	20	-	-	14	14	-	1	-	-	1
39,	.	.	5	-	5	10	18	8	-	26	-	-	29	29	-	-	-	-	-
40,	.	.	-	-	1	1	10	7	-	17	-	-	15	15	1	1	-	-	2
41,	.	.	1	1	-	2	6	2	-	8	-	-	8	8	-	-	-	-	-
42,	.	.	9	6	4	19	20	10	-	30	-	1	42	43	3	4	-	-	7
43,	.	.	1	1	4	6	26	5	-	31	-	-	24	24	-	-	-	-	-
Grand Total,	.	.	99	46	80	225	404	117	-	521	15	26	847	888	19	21	1	1	41

Analysis of the Mortality of Boston—Concluded.

HEALTH DISTRICT	MALARIA.				PNEUMONIA.				ALL OTHER CAUSES.				AGGREGATE.			
	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20,	15	1	—	16	10	5	20	35	53	27	122	202	133	90	255	478
21,	23	12	4	39	7	17	25	49	95	45	227	367	205	142	383	730
22,	4	4	2	10	7	7	14	28	30	14	58	102	57	35	142	234
23,	9	1	—	10	2	1	16	19	22	10	111	143	59	25	201	285
24,	4	1	1	6	2	2	5	9	22	10	53	85	53	20	80	153
25,	1	—	1	2	3	1	1	5	3	2	41	46	9	4	56	69
26,	1	—	—	1	7	4	19	30	28	18	119	165	56	48	207	311
27,	1	—	—	1	—	—	6	6	4	2	31	37	8	2	51	61
28,	—	—	—	—	—	—	1	1	2	—	5	7	3	—	11	14
29,	4	2	—	6	7	3	17	27	35	15	74	124	81	41	140	262
30,	16	10	1	27	12	20	29	61	118	52	211	381	260	152	418	830
31,	1	2	1	4	2	3	7	12	24	6	96	126	40	18	162	220

32,	.	.	.	-	-	-	-	1	1	2	5	2	11	18	9	8	22	39
33,	.	.	.	1	-	1	1	2	7	10	12	7	34	53	16	13	68	92
34,	.	.	.	4	1	5	4	2	6	12	7	6	46	59	37	22	83	142
35,	.	.	.	1	2	-	3	1	13	19	23	12	74	109	47	30	139	216
36,	.	.	.	1	1	1	3	3	8	11	13	8	41	57	19	14	78	111
37,	.	.	.	4	1	-	5	6	9	21	30	11	72	113	62	40	131	233
38,	.	.	.	6	4	-	10	7	3	14	17	11	67	95	49	28	91	168
39,	.	.	.	1	1	-	2	4	11	20	31	11	55	97	63	42	111	216
40,	.	.	.	1	-	1	2	2	2	5	16	7	45	68	29	20	70	119
41,	.	.	.	-	-	-	-	1	5	7	5	3	23	31	14	11	37	62
42,	.	.	.	2	6	1	9	8	13	29	37	17	69	123	87	73	147	307
43,	.	.	.	1	-	1	2	1	6	7	24	8	79	111	53	22	126	201
Grand Total,	.	.	.	101	49	14	164	97	98	244	839	299	1,764	2,719	1,449	900	3,204	5,553

Ratio of Mortality, showing the Number of Deaths from various Diseases to One Thousand of Population.

HEALTH DISTRICT.	POPULATION, JUNE, 1870.				SCARLATINA.				MEASLES.				SMALLPOX.			
	Under 1 Year.	1 to 4, Inclusive.	5 and over.	Total.	Under 1.	1 to 4, Inclusive.	5 and over.	Total.	Under 1.	1 to 4, Inclusive.	5 and over.	Total.	Under 1.	1 to 4, Inclusive.	5 and over.	Total.
20, .	684	2,270	22,582	25,516	7.5	11.5	.6	1.7	1.5	-	-	.08	-	-	.1	.1
21, .	720	2,610	21,589	24,919	4.2	3.	-	.4	4.2	5.8	.1	.7	-	-	.1	.1
22, .	264	743	8,568	9,575	3.8	4.	.1	.5	-	-	-	-	-	-	.4	.3
23, .	164	753	9,981	10,898	-	1.3	.3	.4	-	2.6	.1	.3	-	-	.2	.2
24, .	109	386	5,225	5,720	-	2.6	-	.2	9.1	-	-	.2	-	-	.2	.2
25, .	22	88	4,387	4,497	-	11.4	.2	.5	-	-	.2	.2	-	-	.2	.2
26, .	256	890	12,940	14,086	-	8.8	-	.2	-	2.2	.2	.2	-	-	.2	.1
27, .	33	154	3,710	3,897	-	-	-	-	-	-	-	-	-	-	-	-
28, .	30	126	2,279	2,435	-	-	-	-	-	-	-	-	-	-	-	-
29, .	316	957	8,315	9,588	3.2	4.2	.1	.6	3.2	2.1	.1	.4	-	-	-	-
30, .	1,007	3,310	28,439	32,756	4.9	3.9	.3	.8	3.9	2.4	.1	.4	-	-	.1	.1
31, .	189	599	10,490	11,278	-	1.7	.1	.2	5.3	-	-	.1	-	-	.4	.2

Ratio of Mortality—Continued.

HEALTH DISTRICT.	CROUP AND DIPHTHERIA.				TYPHOID FEVER.				DIARRHEA AND DYSENTERY.				CHOLERA INFANTUM.				CONSUMPTION.			
	Under 1.	1 to 4, in- clusive.	5 and over.	Total.	Under 1.	1 to 4, in- clusive.	5 and over.	Total.	Under 1.	1 to 4, in- clusive.	5 and over.	Total.	Under 1.	1 to 4, in- clusive.	5 and over.	Total.	Under 1.	1 to 4, in- clusive.	5 and over.	Total.
20, .	3.	5.7	.2	.8	*	1.3	.9	.9	16.6	2.2*	.3	.9	45.2	2.2	-	1.5	4.5	.9	2.9	2.8
21, .	4.2	3.	.1	.5	-	1.1	.8	.8	18.1	3.4	.3	1.2	76.4	7.3	-	2.9	2.8	1.9	4.5	4.2
22, .	-	2.7	-	.6	-	-	.9	.8	11.4	1.3	.7	.9	41.8	5.4	-	1.5	3.8	-	5.9	5.3
23, .	6.	2.6	-	.3	-	-	.8	.7	42.7	1.3	.9	1.6	91.5	6.8	-	1.8	6.	-	5.1	4.8
24, .	-	5.6	-	.4	-	-	.5	.5	45.9	-	.4	1.6	156.	2.6	-	3.1	18.3	5.6	2.9	3.
25, .	-	-	-	-	-	-	.4	.4	-	-	.9	.9	90.9	-	-	.4	-	-	.9	.9
26, .	3.9	6.7	-	.5	-	2.2	.8	.9	71.8	5.6	.3	.7	50.8	6.7	-	1.3	7.8	1.1	4.3	4.1
27, .	30.3	-	-	.3	-	-	.8	.8	-	-	.5	.5	30.3	-	-	.3	-	-	2.4	2.3
28, .	-	-	-	-	-	-	.4	.4	-	-	-	-	33.3	-	-	.4	-	-	1.8	1.6
29, .	-	3.1	-	.3	-	1.1	.4	.4	25.3	2.1	.4	1.5	72.4	7.3	-	3.1	6.4	2.1	4.9	4.7
30, .	4.9	3.9	.1	.7	-	.3	.3	.4	18.8	1.2	.3	1.	74.5	6.6	-	2.9	1.8	1.5	4.9	4.4
31, .	-	3.3	-	.2	-	1.7	.7	.8	10.6	-	.7	.8	52.9	3.3	-	1.1	-	1.7	3.8	3.6

32, . . .	-	4.7	-	.3	-	-	-	18.8	9.3	-	.8	56.6	-	-	.8	-	4.7	2.4	2.5
33, . . .	-	6.2	.2	.6	-	-	1.2	1.1	12.	-	.2	12.	3.1	-	.4	-	3.1	3.6	3.5
34, . . .	-	1.9	.3	.4	-	-	.5	.6	23.7	3.7	.1	.6	94.7	7.5	2.5	-	3.7	2.9	2.9
35, . . .	4.8	6.	.1	.6	-	-	.7	.6	4.8	3.	.3	.5	66.9	1.5	1.4	-	1.5	3.9	3.7
36, . . .	-	2.7	.1	.1	-	-	.4	.4	11.6	2.7	.3	.5	34.9	-	.4	-	-	2.8	2.7
37, . . .	-	6.8	.2	.8	-	-	.5	.5	10.2	2.8	.2	.7	54.3	5.8	1.9	-	1.9	3.6	3.4
38, . . .	-	12.4	.3	1.2	-	-	.2	.2	7.7	-	.3	.4	139.5	4.1	3.1	-	-	2.5	2.2
39, . . .	.9	7.5	.3	1.2	-	-	.7	.6	19.7	-	.7	1.2	70.9	8.5	3.	-	-	3.9	3.4
40, . . .	-	-	-	-	-	-	.5	.6	-	-	.2	.2	76.9	14.6	2.7	-	-	2.6	2.4
41, . . .	-	-	-	-	-	-	.2	.1	6.2	1.5	-	.3	37.	2.9	1.2	-	-	1.4	1.2
42, . . .	-	3.2	-	.4	-	-	1.5	1.2	29.9	6.5	.6	2.3	66.6	10.7	3.7	-	1.1	6.1	5.4
43, . . .	-	5.3	.2	.6	-	-	.7	.7	3.2	1.1	.4	.4	84.1	5.3	2.6	-	-	2.2	1.9
Grand Total, .	2.5	4.3	.1	.6	-	.6	.6	.6	16.6	2.3	.3	1.	67.9	5.7	2.1	2.5	1.4	3.8	3.5

Ratio of Mortality—Concluded.

HEALTH DISTRICT.	TUBERCULAR MENINGITIS.				MALARIA.				PNEUMONIA.				ALL OTHER CAUSES.				AGGREGATE.			
	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20, . . .	4.5	.9	—	.2	22.6	.4	—	.6	15.1	2.2	.9	1.3	79.8	11.9	5.4	7.9	200.3	39.6	11.3	18.7
1, . . .	1.4	.8	—	.1	31.9	4.6	.2	1.6	9.7	6.5	1.1	1.9	131.9	17.5	10.4	14.8	284.8	54.4	17.6	29.2
22, . . .	—	—	—	—	15.1	5.4	.3	1.	26.5	9.4	1.6	2.9	113.6	18.7	6.7	10.6	216.	46.9	16.7	24.4
23, . . .	12.2	2.6	—	.3	54.9	1.3	—	.9	12.2	1.3	1.6	1.7	134.1	13.4	11.1	13.1	359.6	33.2	20.1	26.1
24, . . .	—	—	—	.2	36.7	2.6	.2	1.	18.3	5.6	.9	1.5	201.8	25.9	10.1	14.8	486.1	51.8	15.2	26.7
25, . . .	—	—	—	—	45.5	—	.2	.4	136.4	11.4	.2	1.1	136.4	22.7	9.5	10.2	409.2	45.5	12.7	15.2
26, . . .	3.9	1.1	—	.1	3.9	—	—	.1	27.3	4.5	1.5	2.1	109.4	20.5	9.2	11.7	218.7	53.9	16.7	22
27, . . .	30.3	—	—	.3	30.3	—	—	.2	—	—	1.6	1.5	121.2	12.9	8.3	9.4	242.4	12.9	13.7	15.6
28, . . .	—	—	—	—	—	—	—	—	—	—	.4	.4	66.6	—	2.2	2.8	100.	—	4.8	5.7
29, . . .	—	—	—	—	12.8	2.1	—	.6	22.4	3.1	2.	2.8	110.7	15.6	8.9	12.9	256.5	42.8	16.8	27.3
30, . . .	3.9	1.2	.04	.3	15.8	3.0	.04	.8	11.9	6.	1.	1.9	117.2	15.6	7.4	11.6	258.	45.6	14.6	25.3
31, . . .	—	—	—	—	5.3	3.3	.1	.3	10.6	5.	.7	1.1	126.9	10.	9.2	11.1	211.6	30.2	15.4	19.5

32, . . .	-	-	-	-	-	-	-	-	-	4.7	.3	.5	94.3	9.3	2.9	4.3	169.7	37.4	5.9	9.8
33, . . .	-	-	-	-	-	-	12.1	-	-	6.2	17	2.1	144.7	21.6	8.2	11.5	192.8	40.2	15.1	20.1
34, . . .	-	1.9	-	.1	23.7	1.9	-	.6	23.7	3.7	.8	1.5	41.5	11.3	6.3	7.4	219.	41.3	11.3	17.7
35, . . .	4.8	-	-	.1	4.8	3.	-	.2	23.9	1.5	1.3	1.7	110.	18.1	7.6	10.4	224.9	45.2	14.1	20.1
36, . . .	-	27	-	.1	11.6	2.7	.1	.3	-	8.1	1.1	1.4	151.2	8.1	5.6	7.2	220.9	37.8	10.6	14.2
37, . . .	6.8	.9	-	.3	13.2	.9	-	.4	20.4	5.8	.9	1.8	102.	10.7	6.8	9.1	210.2	38.6	12.4	19.4
38, . . .	-	2.	-	.2	46.5	8.1	-	1.5	54.2	8.1	.5	2.1	131.9	22.3	11.4	14.7	379.8	57.	15.5	26.
39, . . .	-	-	-	-	3.9	1.1	-	.2	19.7	4.3	1.5	2.3	118.1	11.7	7.5	11.3	244.	44.8	15.1	25.3
40, . . .	7.6	2.1	-	.3	7.6	-	-	.2	7.6	4.2	.4	.7	123.1	14.6	7.7	10.7	223.1	41.7	12.2	18.8
41, . . .	-	-	-	-	-	-	-	-	6.2	1.5	.8	1.	30.9	4.5	3.9	4.5	86.2	16.3	6.2	9.1
42, . . .	9.9	4.3	-	.9	6.8	6.4	.2	1.1	26.5	8.4	1.9	3.5	122.9	18.1	10.1	15.1	289.	77.7	21.4	37.9
43, . . .	-	-	-	-	3.2	-	-	.1	-	1.1	.5	.5	77.5	8.5	7.2	9.	171.2	23.4	11.4	16.3
Grand Total.	3.2	1.	-	.2	16.6	2.4	.1	.7	16.6	4.8	1.1	1.4	110.2	14.1	7.9	10.9	243.3	43.6	14.2	22.1

NOTE.—In the foregoing tables all deaths in the city of Boston during 1870, are included, except those of still-born children, and deaths occurring at Deer Island, Carney Hospital, the Saint Anne Infant Asylum, and the Consumptive Home in Willard Street. The deaths at the Massachusetts General Hospital and the City Hospital are transferred to the Districts in which the patients lived previous to their admission. 486 deaths are thus omitted from the tables because they could not fairly be assigned to the Districts in which the above-named public institutions happen to be situated. Adding this number to the 5,533 above accounted for, the total mortality of Boston becomes 6,039, and the death-rate 24.10 in a thousand.

An examination of the tables brings to light many interesting facts which have not before been attainable.

The first gives in numerical form the condensed material obtained from the death records. The second gives the total population of each District, and the number of children under one and between one and five years of age living in each.

Then comes the list of those diseases whose comparative prevalence in a series of years determines the death-rate of all communities in Massachusetts. The list is seen to include those which have the strongest claims to be regarded as preventable diseases.

By tracing along the column one may see how destructive each disease was in each District, and what proportion of a thousand died from it among the infants, among the young children, and among the adults. Thus, for instance, in the very populous northern half of South Boston (No. 30), we see that among 1,007 infants 4.9 in 1,000 died from scarlet fever, while in the region east of the Providence Railroad crossing, in what was lately Roxbury (No. 42), among 301 infants the deaths from the same cause were at the rate of 26.4 in 1,000.

Croup and diphtheria are in the same way discovered to have been more prevalent in Districts 38 and 39, while three Districts have had no deaths from this cause.

Typhoid is found to have been most prevalent in Districts 42, 33, 22, 20, 26 and 21; dysentery and diarrhœa in 42. Cholera infantum is seen to have killed very nearly 68 in a thousand of all the nursing children in the city, and this in such enormously disproportionate numbers in the various Districts as may surprise those who do not already know the influence which overcrowding and filth have upon this disease. As the cholera infantum column should be studied chiefly in the age under one year, so the next in the list, consumption, should be judged by the ages over five. The greatest mortality is seen to be in Districts 42, 22, 23, 29 and 30, and the least mortality in Districts 25, 41 and 28.

Marasmus is the somewhat indefinite disease assigned in the case of a certain number of children in whom a gradual wasting of flesh and strength has preceded death. Districts 23, 38, 25, 24 and 21 show very plainly that this mortality among infants is associated with a dense population. Pneumonia, a disease of

all ages, but especially fatal at the extremes of life, shows a greater uniformity in its distribution through the districts than any other of the list.

Coming now to the aggregate mortality from all causes we find that in District 24 nearly half of all the infants died within the year. This is to be accounted for in part by the large number received at an establishment in Portland Street, where wet nurses are always to be obtained.

In District 25 the ratio is also very large, but it will be seen that the whole number is small.

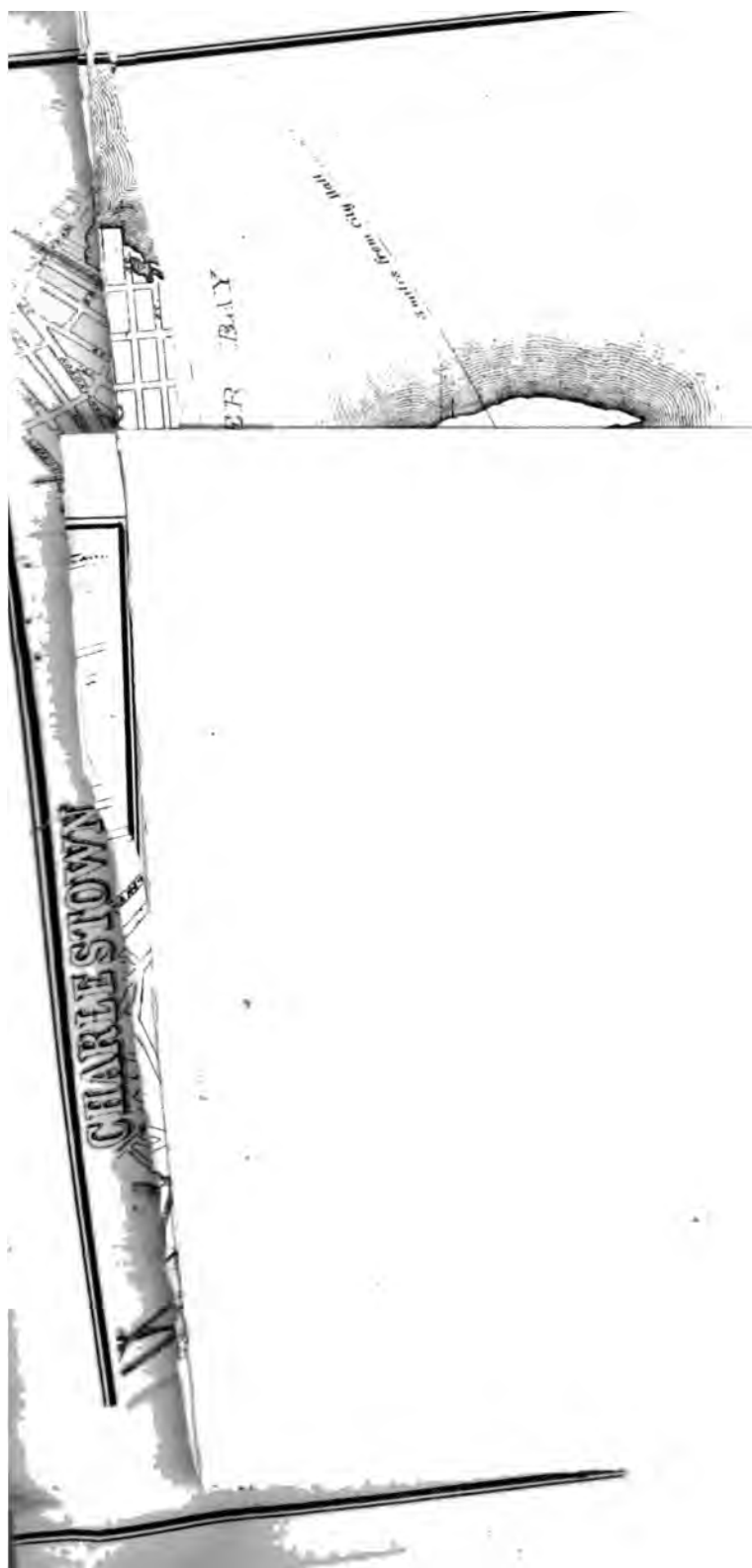
In Districts 38 and 23 more than one-third of the whole number of infants died; in Districts 42, 21, 29 and 30 more than one-quarter, and in Districts 39, 27, 40, 26, 22, 31, 36, 84 and 20 more than one-fifth. On the other hand in District 41 the mortality among infants was less than one-tenth.

Looking now at the general death-rates for all ages we see a very great disparity in the several Districts, ranging from 5.7 (District 28), 9.1 (District 41), and 9.8 (District 32), up to the enormous rate of 37.9 in a thousand in District 42. This latter region is low, imperfectly drained, in parts densely peopled and full of nuisances which have been allowed to grow and fester unchecked by the city authorities. Stony Brook between Tremont Street and the Providence Railroad, and also in the neighborhood of Parker Street, has been a source of disease to all the dwellers in its vicinity. The stench from this neighborhood has been often perceptible during the past summer at the distance of a mile. District 42 is also in the immediate neighborhood and under the influence of the sunken tract about Ruggles Street, in District 37, on which water has been standing continually during the past hot summer. Fortunately the tract in question is hardly peopled as yet, although covered with new houses which must be raised, like Church and Suffolk Streets, at a vast expense, most of which might have been saved if the health authorities of the city had done their duty. District 21 is next most fatal to life. It is very densely peopled and contains the worst tenement houses in Boston. District 29, with its crowded and narrow streets leading from Harrison Avenue to the South Bay, comes next in order; 38, 24, 23, 30, 39 and 22 follow not far behind in their ratios of death to population.

The death-rates of East Boston and the North End present a

contrast which is worthy of examination. These Districts are of nearly equal population and the numbers at all ages very nearly correspond, yet the mortality in one is half as great again as in the other. One is crowded, in great part deprived of sunlight, and full of nuisances ; the other has abundance of light and air. Can a stronger argument be offered in favor of providing breathing spaces for the people than is presented by the figures in the first two horizontal lines of our second table, from one end to the other ?

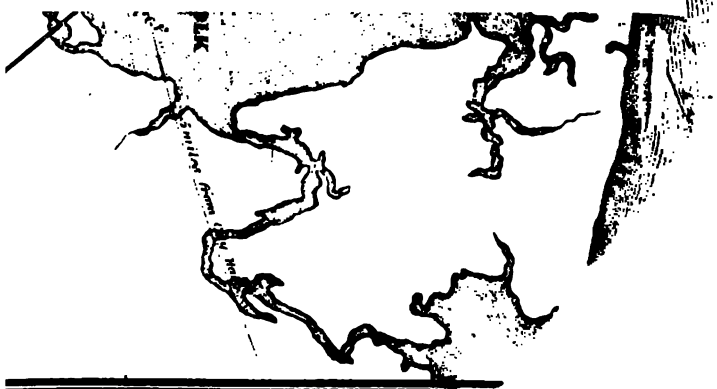
The very limited time which is given us between the completion of this tabular analysis at the close of the year, and the presentation of our Report to the legislature, must prevent more extended comment on the many instructive facts which it makes apparent.







11





DISTRICTS
OF
BOSTON
managed by
THE BOARD OF HEALTH.
How the mortality in
1870.

THE VENTILATION OF SCHOOL-HOUSES.

BY A. C. MARTIN, ARCHITECT,

OF BOSTON.

THE VENTILATION OF SCHOOL-HOUSES.

The importance of thoroughly ventilating school-houses is acknowledged by everybody, while the number of persons who have considered the amount of ventilation required to keep a room in a wholesome condition, and the best way to produce the necessary change of air is comparatively small.

All know that the condition of the air in most school-rooms an hour after the session has commenced is very bad, so bad as to induce a morbid condition of the system, impairing the mental vigor of both teachers and scholars.

The cause of the trouble is commonly stated to be the presence of carbonic acid in the air which we exhale. When first thrown off from the lungs, it is warmer than the surrounding air and therefore rises to the upper part of the room; consequently, in the popular idea, the bad air is always at the top of the room. According to the same theory it is only necessary to make a hole somewhere in or near the ceiling to let it off, and thus the room is properly ventilated. This theory of ventilation, it should be noticed, makes no provision whatever for a supply of fresh air in those school-rooms (no small proportion of the whole number), which are warmed by stoves. In cases where furnaces are used, they are commonly regarded as sources merely of heat; seldom as the means of a supply of *fresh air*. Registers are placed somewhere in the floor, but their size and disposition are left to convenience or to the discretion of the furnace dealer, whose sole aim is to furnish *heat*, not air. True, some air must make its way through the hot-air pipes, but as soon as the temperature of the room is so high as to be too warm for comfort, the register is closed, thus shutting off entirely any supply of fresh air except what may creep in through the crevices around the doors and windows. If further relief from heat or close air becomes necessary, the windows are let

down a little from the top. The result of this is that the cold air rushes in and fills the bottom of the room, causing dangerous draughts for those who sit near the windows, and cold feet for everybody.

If we examine this popular notion concerning the theory and practice of ventilation, we shall find its explanation of the cause of the difficulty falls as far short of stating the whole case, as the remedy proposed fails to accomplish the desired end.

As we have seen, the carbonic acid gas exhaled from the lungs is looked upon as the principal evil. Its presence is, indeed, clearly recognized and the amount given off by the lungs has been determined to be about four per cent. of the air exhaled.*

But so far from its being the principal evil in vitiated air, it is proved by experiment that a still larger proportion of carbonic acid than is contained in the close air of an unventilated room, may be mixed mechanically with ordinary air, and breathed without inconvenience. The workmen engaged in the manufacture of soda-water do not experience any ill effects from breathing large quantities of it.

We must, then, seek further for sufficient causes for the foul condition of the air in an occupied room. We shall discover in it not only this deleterious acid, but in still greater proportion the watery vapor and the animal matter thrown off by both lungs and skin. The amount of watery vapor given off by the lungs and skin has been variously estimated as from twenty to forty ounces in the twenty-four hours, or about six to twelve grains (troy) per minute. This vapor contains animal matter which seems to putrefy almost immediately after being thrown into the air. It is the source of the vile odor in an ill-ventilated room, and, in its effects on the health, is far more dangerous than carbonic acid gas, which is now generally considered as acting rather as an obstructor of respiration than as a positive poison. No surer or more exact test than a well-educated nose has, as yet, been discovered to measure the amount of vitiating animal matter thus thrown into the air, but of its sources we can form some inferences.

* The difference in quantity is caused by varying circumstances. The amount thrown off is least during the night and greatest during the day. It would seem that the maximum and minimum amounts depend upon the state of digestion or the degree of physical exertion.

The immediate emanations of the body itself we have just mentioned. All clothing, carpets and furniture are adding constantly to the air the minute particles worn off by friction. A beam of sunlight thrown across the best-kept room marks its way on the dust in the air, and we all remember what we have seen floating in the air of school-rooms. Still another element of evil must be counted in the clothing of children of the poorer classes, which is worn and kept in homes that have never known an airing. It is easy to detect, in some school-rooms, the odors resulting from the different occupations of the children's parents, mingled with the scent from the frying of the family doughnuts or the smoke of the paternal tobacco-pipe. What science hints of the germs of disease in the air about us, might startle the most careless, but such details are unnecessary when we are discussing ventilation, not for cases where great crowds of people are assembled, or where unusual causes create foul air, as in the sick-wards of a hospital, but in relation to the far simpler question how we can best ventilate and warm our school-rooms.

One general consideration remains to be added to this brief statement of the elements of evil in foul air. The air we breathe is exhausted of its life-giving power after a few inhalations. Deprived of its normal proportion of oxygen, it is thus rendered unfit for its proper uses. Again, the carbonic acid, the watery vapor, the animal matter and the minute dust are soon diffused throughout the room. The question where the air is worst may be taken up later, but it must be manifest from what has been said that the entire air of a close room soon becomes vitiated in every part. Still further,—we are considering rooms in which the children daily spend five or six hours, the teachers, often seven or eight. The children are at an age when respiration is most active and when nature demands an ample supply of air of the purest quality.

We are, then, forced to conclude from the nature of the evil and from the imperative necessity of its entire removal, that no remedy can be successful which does not ensure a full and complete renewal of the air in the room as often as it becomes foul or dead. Nothing less than an absolute change of the whole volume of air can accomplish the object.

How often this should be done within a given time must de-

pend upon the size of the room and the number and age of the persons occupying it. Authorities differ as to the amount of air to be supplied to insure a proper ventilation, but it is generally admitted that it should be not less than ten cubic feet per minute for each person. It may be that children require as much as adults, as they breathe faster. The actual amount of air-space in the room must also be carefully considered.

The Royal Commissioners appointed by the British government to inquire into the sanitary condition of barracks and hospitals, reported in 1857 that the capacity of the rooms should be not less than six hundred (600) cubic feet of air-space for each soldier, and the supply of air, per minute and per man, not less than twenty cubic feet. Messrs. Fairbairn, Glaisher and Wheatstone reported about the same time to the general bureau of health that the supply should be from fifteen to twenty cubic feet per minute for each individual. Gen. Morin, the director of the "Conservatoire des Arts et Metiers," gives the amount at from twenty to thirty cubic feet. These estimates, it will be observed, are for adults, and, in the case of the soldiers, for sleeping-rooms occupied from eight to nine hours consecutively. For children and school-rooms, the amount of air required varies, according to Gen. Morin, from seven to eighteen cubic feet per minute, in proportion to age; and the air-space from two to three hundred feet.

As an illustration, we will take an ordinary grammar school-room for fifty-six scholars. Such rooms in Boston are twenty-eight feet wide, thirty-two feet long and twelve feet high; containing 10,752 cubic feet, or 192 cubic feet to each scholar. If we assume ten cubic feet per minute as the minimum supply for each scholar, it will require 560 cubic feet of fresh air per minute for the school-room; or 33,600 cubic feet per hour. This supply would renew the whole volume of air in the room three times in an hour. If we assume fifteen cubic feet per minute for each scholar, it will require for the whole school 840 cubic feet per minute and 50,400 per hour, thus demanding the renewal of the whole volume of the air a little more than four and a half times per hour. The second estimate would prove, in practice, the proper one in the school-room designated, which is not large enough for so many occupants. It should contain at least 220 cubic feet of air-space for each individual.

We have now to consider the means of obtaining this indispensable fresh air. If the mere supply of warm air would ventilate an occupied room, we should have had the question of ventilation, for the cold season at least, settled thoroughly during the reign of hot-air furnaces. For the twenty years preceding the last decade, most school-houses put up in the cities contained neither grates or fire-places, for the furnace was considered the best means of heating and ventilating rooms, and even now some dealers specially advertise their wares as *ventilating furnaces*.

It is obvious that no means of supplying air can accomplish ventilation which does not also provide for the removal of the old and foul air. Any person accustomed to an open fire in a room partially heated by a furnace feels at once the difference in the quality of the air on going into the room of his neighbor who depends solely upon the hot-air register. The open chimney in the one case is constantly drawing off the bad air. In the other it escapes slowly, if at all, through crevices or by the occasional opening of the door. It not unfrequently happens that the hot air ceases to enter through the register for the want of an outlet, and the door must be opened in order to start it.

Our object, then, should be to seek such means of renewal and supply as shall cause and maintain a perfect balance between the in-coming and the out-going air. The old-fashioned fire-place is the first suggestion of the idea. The popular practice we have before mentioned was supposed to be an advance of improvement. It makes a hole near the ceiling to let out the bad air, opens the furnace registers, and considers the work done. On this principle no proper diffusion of fresh air could be obtained. A steady current would soon be established between the register and the ventilator, leaving dead air eddying up and down in the lower part of the room, which may be breathed over and over again before it is drawn into the main current and taken out of the room. Where a running stream passes by a cove of comparatively still water, a counter-current is almost always seen setting up along the shore.

When the air from the register is heated in the winter the difficulty is increased, as the current is accelerated and cold air remains nearly undisturbed, or settles down disagreeably upon the head and shoulders. A person sitting in a church near one

of the large hot-air registers will not unfrequently be annoyed by very perceptible counter-currents of cold air which set downwards beside the ascending hot stream.

To avoid these difficulties and secure the proper *diffusion* of the air are the main questions in all discussions of the subject. The systems proposed seem to have divided themselves into two great classes by taking up the subject at its two opposite ends, one looking to the out-going of the air, the other to its in-coming, though both have as a common aim the perfect balance of the two.

One system concerns itself only with supplying the air, leaving it to make its way out through ducts provided for the purpose. It accomplishes this by blowers or fans which press the air into the room. It is the *plenum* method, and may be farther characterized as the mechanical. It is expensive and requires great and constant care in working, while its success is sometimes doubtful. For these reasons it need not farther be considered for school-house ventilation.

The other system is directed to the withdrawal of the foul air, and this may be accomplished by means of natural laws requiring no machinery other than simple ducts. It is the *vacuum* method. It avails itself of the natural tendency of warm air to rise, which is the result of the law of the dilatation of gases.

“A volume of air heated from the freezing point to the boiling point of water (Barometer at 30 in.), expands .375 or about $\frac{3}{8}$ of its volume, or .002 for each degree Fahr.”—(*Guy Lussac's law.*)

If the temperature of the air in a school-room is 20° higher than that of the exterior air its volume has been increased $.002 \times 20 = .04$ or $\frac{1}{25}$; consequently it is lighter than the exterior air and tends to rise. If a vertical duct or shaft, leading directly upward and out of the building, be connected with such a room a current of air will at once set up through it (subject to the conditions hereafter stated), unless it happens that the shaft or duct be cooled down to the exterior temperature by contact with the outer air. If necessary, heat can be applied to the lower end of the shaft, or the smoke-pipe from the furnace may be carried up through the duct, to increase its draught.

The necessary supply of an equal amount of fresh air will be

drawn into the room, either through the hot-air pipes of the furnace or some special ducts prepared for the purpose, or, failing these, it will work its way in about the doors and windows.

It will be readily understood from what we have before said that the mere hap-hazard arrangement of the register in the floor and the hole in the ceiling will not answer. Good ventilation consists in the proper distribution of the ducts for the outgoing and in-coming air, and in their proper relation and correspondence with each other, so as to secure the perfect removal of the bad air and the thorough diffusion of the new.

The power of a vertical duct to draw the air from a room results from the velocity of the flow of air through it. This velocity depends,—

First, Upon the difference between the external and internal temperature.

Second, Upon the height of the duct.

Third, Upon the resistance or friction; that is to say, upon the straightness and smoothness of the duct.

Fourth, Upon the sufficiency of the supply of air to replace that which is drawn from the room.

The amount of air evacuated by such a duct in a given time depends on the same four conditions, and also upon the area of a cross-section of a duct, that is, upon its size. The following general equations express these relations, in which,—

V is the mean velocity of the air in the duct.

K is a numerical co-efficient dependant upon the form, disposition and friction of the duct, and is constant for each duct.

T is interior temperature.

T' is exterior temperature.

H is height of the duct.

A is the area of a cross-section of the duct.

Q is the volume of air passing in one second.

$$1. V = K \sqrt{(T - T') H}.$$

$$2. Q = KA \sqrt{(T - T') H}.$$

By an inspection of the above equations it will be seen that to increase the velocity of the flow of the air through a vertical duct, and consequently the drawing power of the duct, and also the amount of air evacuated in a given time, we must either in-

crease its height or the excess of the interior temperature above the exterior. By the interior temperature is meant that of the air in the duct, and this is practically the same as that of the room, unless additional heat is applied to the duct.

From the above principles it follows that when the height and disposition of the vertical ducts have been determined by the character of the building, their size should be estimated for summer ventilation when there is the least difference of temperature; and also that the ducts for the upper parts of a building should be made larger than those for the rooms below, if they are required to evacuate the same amount of air. The same reasoning applies to the hot-air pipes. They should be larger in area or cross-section for the rooms below than for those above, because they are shorter and consequently the velocity of the air would be less than in the longer pipes for the rooms above.

The question next arises as to the way of adapting the means to the end. Shall the vertical ducts lead out from the top or the bottom of the room? Shall the fresh air be taken in at the floor or at the ceiling? Which will work to best advantage, an upward or a downward movement in the air of the room?

It might seem at first a matter of small consequence where the air is taken out, since it is safe to say it would soon become bad in every part of a room, but the importance of the point will appear as we proceed.

At first sight it would seem easier to ventilate a room by the general upward movement of the air, because its tendency, when first exhaled from the lungs, is to rise.

A cubic foot of air at 60° Fahr., dew point 40° (Bar. 30 inches), will weigh 534.27 grs. A cubic foot of expired air at 95°, dew point 85°, containing 12.78 grs. of vapor and say four per cent. of carbonic acid, will weigh only 494.12 grs., or seven and one-half per cent. less.

This tendency is further increased by the heat given out from the body, which warms the air in immediate contact with it, so as to cause upward motion enough to be measured by the anemometer.

Nevertheless this upward movement, even when aided by the flow of hot air from the furnace fails to secure a proper diffusion of the fresh air. We have shown, in discussing the claims of furnaces as ventilators, how quickly a steady current will be

formed between the inlet and the outlet, leaving the bad air almost or quite unmoved, and only slowly and partially drawn into the current. If the attempt be made to diffuse the air by taking it in at several different places, it is apt to cause disagreeable draughts of warm air upon persons near the registers. Another objection will be found in the difficulty of heating a room ventilated in this way, because the hot air is drawn off too rapidly, while the great mass of cold air remains at the bottom of the room, thus making a marked difference of temperature between the air at the floor of the room and that at the level of the head, amounting often to six or seven degrees.

If, on the other hand, we connect the duct withdrawing the air with the lower part of the room, we shall have, in the first place, an advantage as obvious as it is important, in the removal of the foul air as nearly as possible at its source. By that law of the diffusion of gases, by which æriform bodies diffuse themselves through each other's masses to an unlimited extent, the carbonic acid in expired air would undoubtedly be diffused throughout the whole room. The aqueous vapor, loaded with animal matter, must also contaminate the whole atmosphere, so that, although after a full school-room has been shut up an hour, it would be hard to say where the air in it is worst, it is plain that the evil can be reached at its source, and should be removed at once before it spreads through the whole apartment. By using the downward movement the dust also (no small part of the trouble), will be drawn off immediately and not scattered everywhere. The emanations from skin and clothing are got rid of far sooner, and the clean and tidy children will not suffer so much from their less tidy neighbors. The good accomplished by the open fire-place is precisely on this principle of taking the air out of the bottom of the room. The whole subject may be well illustrated by the case of a reservoir or pond where some special cause of defilement exists at one end. If, instead of drawing or pumping out the foul water as nearly at the spot as possible, an engineer should undertake to draw it off through the clean water, allowing it to diffuse itself all the way, what folly it would seem.

The foul air should be taken out by openings so distributed around the bottom of the room that the currents of withdrawal shall affect all parts of it, while the fresh air should be introduced at the top. If it comes in at a temperature lower than

that of the room, it should be distributed as much as possible, and directed upward and along the ceiling, so as not to fall directly down upon the heads of those below.

If the air be heated and drawn in by a constant current, it will diffuse itself under the whole ceiling, and, arranging itself in layers, the warmest at the top, will gradually settle down through the room. The diffusion would be nearly or quite perfect, but for the unequal cooling of the air by contact with the outer walls. This inequality would be perceptible, however, only in extreme cases, and the heating of the room would be accomplished without draughts of any sort. For by taking the air out from the bottom of the room at a number of places, the velocity of the current of withdrawal through the registers can be easily made so small as not to be perceived; a current of air of the same temperature as the rest of the room is not unpleasant unless quite rapid, while a current of a higher or a lower temperature is disagreeable, though its velocity be no greater than the former.

So far we have considered the question in its simplest form, viz.: a vertical duct leading directly from the room into the open air. This would be impracticable in a large building, but the principle can be applied with equal success to any number or arrangement of rooms. The ducts should be made to connect with the bottom of a central shaft or chimney, of size and height sufficient to create a strong drawing power in all of them. The smoke-pipe of the furnace passing up through the chimney would aid the draught, or a fire can be built in a grate prepared for the purpose near the bottom. In this way, every part of a large school-house, rooms, halls, water-closets, can be effectually ventilated.

This method has a strong claim to favor from the facility with which the air of a room may be heated to a certain given point. To maintain an even temperature when the heat from the lungs and body is constantly thrown into the room, is one of the chief difficulties in the problem of good ventilation. The success attainable by the use of the downward movement has been repeatedly demonstrated in Europe, where it has been adopted for many years. It is clearly shown in the résumé of one of the most interesting of Gen. Morin's experiments. His object was to heat and ventilate the two amphitheatres or

lecture-rooms of the Conservatoire des Arts et Metiers at Paris, and his success is the more remarkable on account of the special difficulties of adapting ducts to the walls and rooms of an old building. On this account it was necessary to place the ventilating shaft or chimney in the court yard, at a distance from the two rooms. The ducts, which led from many openings around the bottom of both rooms, were connected with the bottom of the chimney where a grate was placed in which a fire was lighted while the rooms were in use, in order to quicken the draught. Both rooms were warmed by furnaces, the heat being taken in at many points around the top of the room. Cold-air flues were so arranged in connection with the hot-air pipes that the hot and cold air might be varied in quantity by opening and shutting valves, and thus the fresh air might be let into the room at just the right temperature. Gen. Morin gives a series of observations on the working of this system from December 16th, to January 9th. The small hall, which will seat 360 persons, held during this time an audience varying from 35 to 360 persons. In the large hall, seating 700, it varied from 278 to 680. Two sessions a day were held and the observations extended through twenty-eight sessions. The temperature out of doors ranged from 32° to 46° Fahr. In the small hall the mean temperature was 68° . The highest at any time was 72° , and this was reached but three times. The lowest, occurring but once, was 64.40° . In the large hall, the mean temperature was $67\frac{1}{2}^{\circ}$. The highest was 72° , the lowest 64° , neither of which extremes was reached more than once.

Remarkable as this uniformity from day to day appears, the equality of temperatures at the top and bottom of the room is still more worthy of note. Though the audience was trebled in one room and increased tenfold in the other, the thermometers at the floor and at the ceiling never differed more than $3\frac{1}{2}^{\circ}$ Fahr.

It might be supposed that results so successful were attained only by the employment of attendants of great skill and experience. On the contrary, the furnace and ventilating apparatus were managed by the regular porter whom Gen. Morin describes as of the ordinary intelligence and faithfulness of his class. He adds: "After a very few days, the attendant became so familiar with the management of the apparatus that whatever the number of the audience or the exterior temperature,

he succeeded in limiting the range of the interior temperature between 65° and 70° Fahr."

Many large buildings are warmed with air heated by passing over two or three coils of steam-pipe. In such cases too great heat could easily be avoided by the use of valves to shut off the steam from one or more of the coils of pipe, leaving the fresh air to flow unchecked. This plan avoids entirely the fault of shutting the register in a school-room, thus excluding the fresh air as well as the heat.

If the common furnace is used, great care should be taken to manage the fire so as not to throw the dangerous gases from hard coal into the air-chamber, whence they will inevitably be carried into every room. The valve in the smoke-pipe often causes much harm in this way, when it is used to check the draught; the draught itself should not be checked too soon or too much, lest the coal be burned without giving out its proper amount of heat, and the poisonous carbonic oxide be evolved from it. Mistaken economy is often the unsuspected cause of the trouble from gas in houses and school-rooms.

Can we plead too strongly for a thoughtful consideration of this subject? Fresh air is not a luxury, not even an essential comfort, but an absolute necessity for the children. The duty of providing it is imperative. The cost is to be counted a trifle in proportion to the good to be gained. We build our walls tight and strong to keep out the cold, and then complain that we must pay money for fresh air, the most bountiful gift of nature. Let the school-houses at least be planned and built, in the first instance, with free channels for the air to come and go, then the item of ventilation will make small show in the construction accounts. When the blessing of ventilation is fully understood, the most grumbling of tax-payers will admit that money spent for it was never better invested. Then shall it no longer be said that teaching is more wearing than any other profession requiring the same actual labor, but teachers and scholars shall work without over-fatigue or listlessness in their fresh, sweet school-rooms.

EXPLANATION OF WOOD-CUTS.

Nos. 1 and 2 show the plan and section of a small country school-house for fifty-six scholars. The room is heated by a stove, surrounded by an envelope. This casing will prevent the

direct radiation of the heat which makes the seats near by so uncomfortably warm. But its main purpose is to aid in heating the fresh air which comes in by a duct (marked A) made under the floor, with an opening beneath the stove. It is precisely similar to the "cold-air box" of a furnace, and should be made large and have a valve for regulating the supply of fresh air. The cold air from out of doors is thus warmed by the stove and rises up within the envelope to the top of the room, where it is diffused along the ceiling and thence is drawn down by the action of the ventilating ducts. Of these there are four horizontal ones, shown by the dotted lines. They may be made between the floor timbers, and should be as smooth as possible, with the angles rounded where a change of direction is necessary. Each of them has four inlets (shown by the pairs of curved arrows), making for the room sixteen outlets for foul air. These openings into the ducts should be protected by a raised hood placed under the seat with a wire guard over it (see figure 7). Moreover the ducts should have partitions under each opening (see figure 8), to insure a flow of air through each of them. These ducts are all connected with the vertical shaft at B. The smoke-pipe from the stove is carried up through its whole height so that the heat radiated from it may be utilized in rarefying the air in the shaft, in order to help the draught.

The sizes of foul air registers, ducts and shaft, are calculated as follows:—

There are fifty-six scholars, each requiring fifteen cubic feet of air per minute, which makes for the whole room, 840 cubic feet, or fourteen cubic feet per second. For ventilation in early fall or late spring, when it is too warm for fires and too cold for open windows, we can obtain a velocity of three and a half feet per second in the shaft by the aid of a small stove placed in the bottom of it. Therefore the shaft must have a cross-section of four square feet, in order at that velocity to draw off the required fourteen cubic feet per second. Each horizontal duct must pass one-quarter of fourteen cubic feet per second, or three and a half cubic feet, with a velocity of about two and a half feet per second. A cross-section must then be one and one-fourth square feet, or twelve by fifteen inches. Each foul-air register will be required to pass one-fourth of three and a half cubic feet per second with a velocity of two feet. Its area must then be .4375 square feet,

equal to sixty-three square inches or eight by eight inches. The outflow of air can be increased or diminished by the use of a valve in the shaft by which its withdrawing power can be controlled. In case more fresh air is required than that supplied through the envelope of the stove, when the valve in the fresh-air duct is wide open, openings (C) are made through the ceiling into the attic in which is a window (D) which can be raised and lowered by means of a cord below. The drawing power of the ventilating shaft will at once determine an influx of cold air which should be directed and diffused along the ceiling. Should a furnace be used to heat such a room, the ducts for withdrawing the air should be precisely the same as in the plan. The hot-air flues should be carried up to the ceiling with passages for cold air beside them in order to temper the heat if desired. See figure 6. The valve can be held by the cord in any position required, so as to admit all cold or all hot air or any proportion necessary. (The figure shows the cold air entirely cut off.) The power of the current in the vertical shaft will secure the upward flow of the cold air.

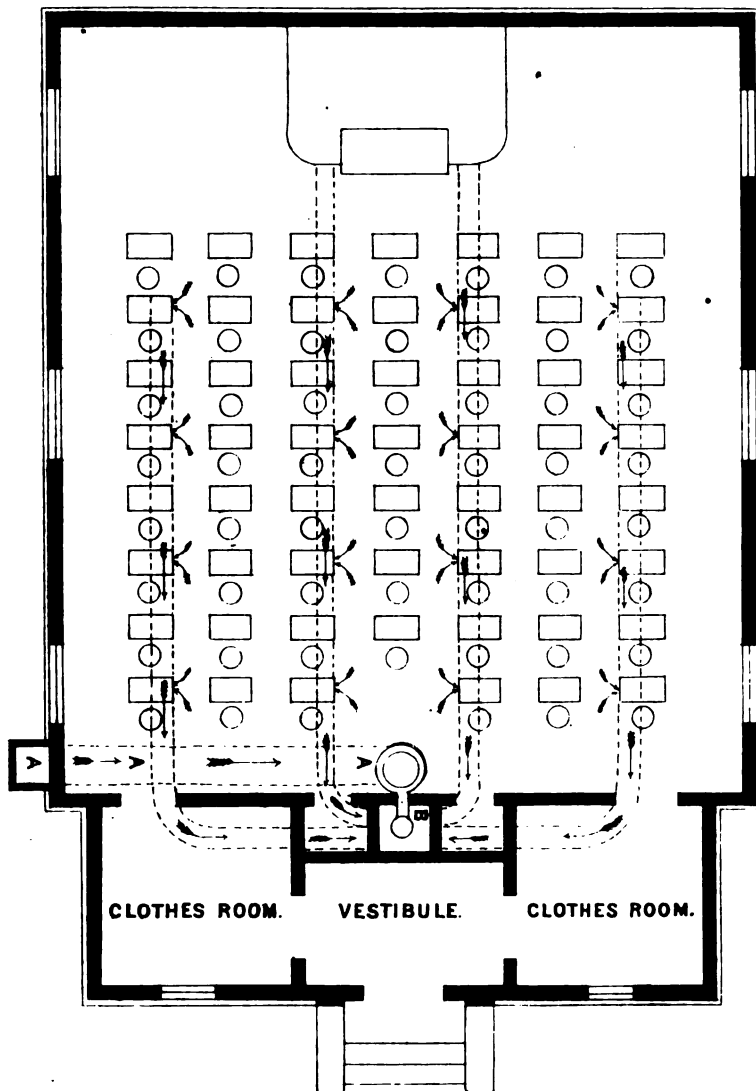
Figures 3, 4 and 5 represent the basement and first and second stories of an eight-room school-house. In such a building there is generally a large hall in the third story which prevents carrying the vertical ducts up through the roof; therefore it is more convenient to carry the foul air down into the basement by ducts connected with a ventilating chimney (see Gen. Morin's experiments, above), which should be large enough to ventilate the whole building, including the large hall. Fig. 3, shows the secondary collecting ducts under the basement floor, and their connection with the bottom of the chimney.

The calculations for this case are precisely like those for one room. The minimum velocity of the flow of air in the chimney should be about six feet per second. It may be increased by steam coils or a fire in the bottom to nine, or, in cold weather, even twelve feet per second.

In room M, Fig. 4, the horizontal ducts are shown with the foul-air registers. Room N shows the distribution of the fresh air through a hollow cornice made for the purpose. Room O shows the position of the desks.

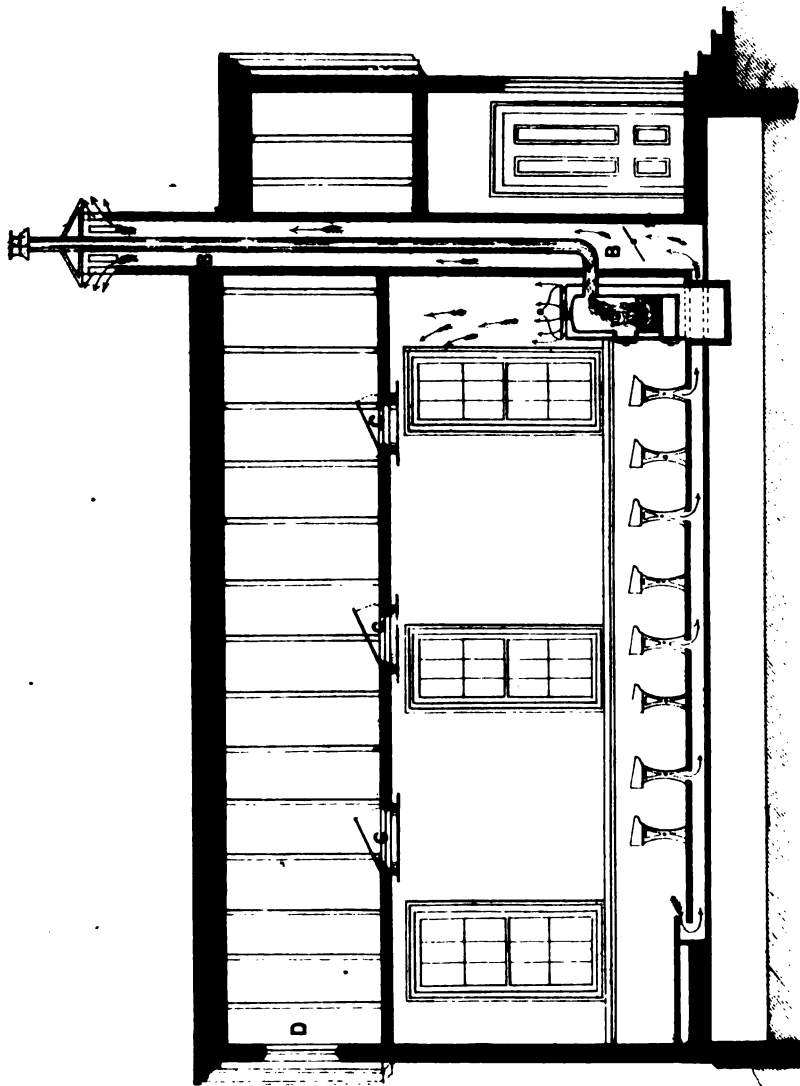
Fig. 5. is a section taken on the line X—Y of the plan, and shows the primary and secondary collecting ducts and the main shaft.





PLAN FIG. I.





LONGITUDINAL SECTION. FIG. 2.

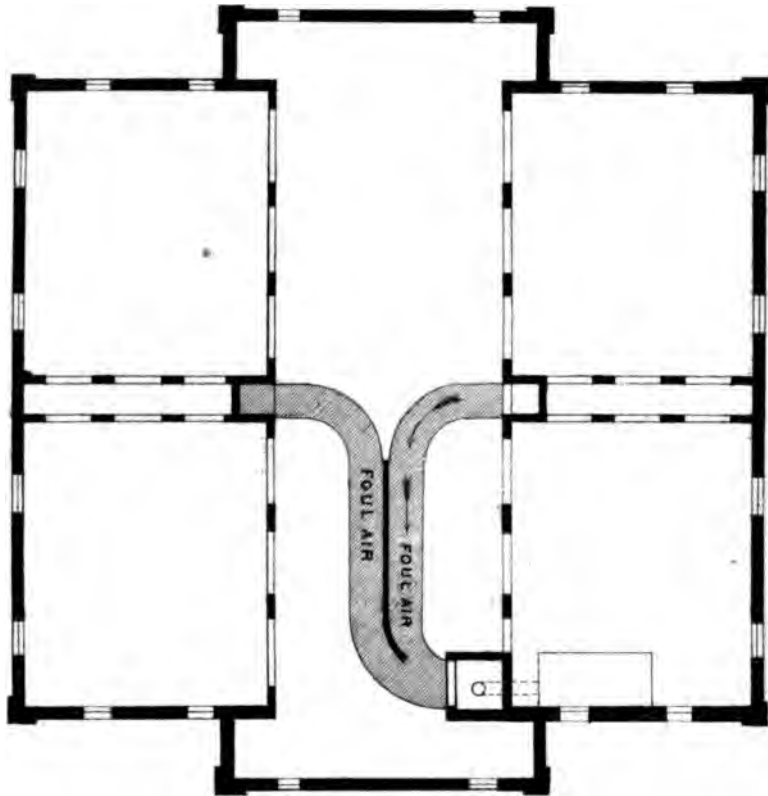


FIG. 3.
PLAN OF BASEMENT.

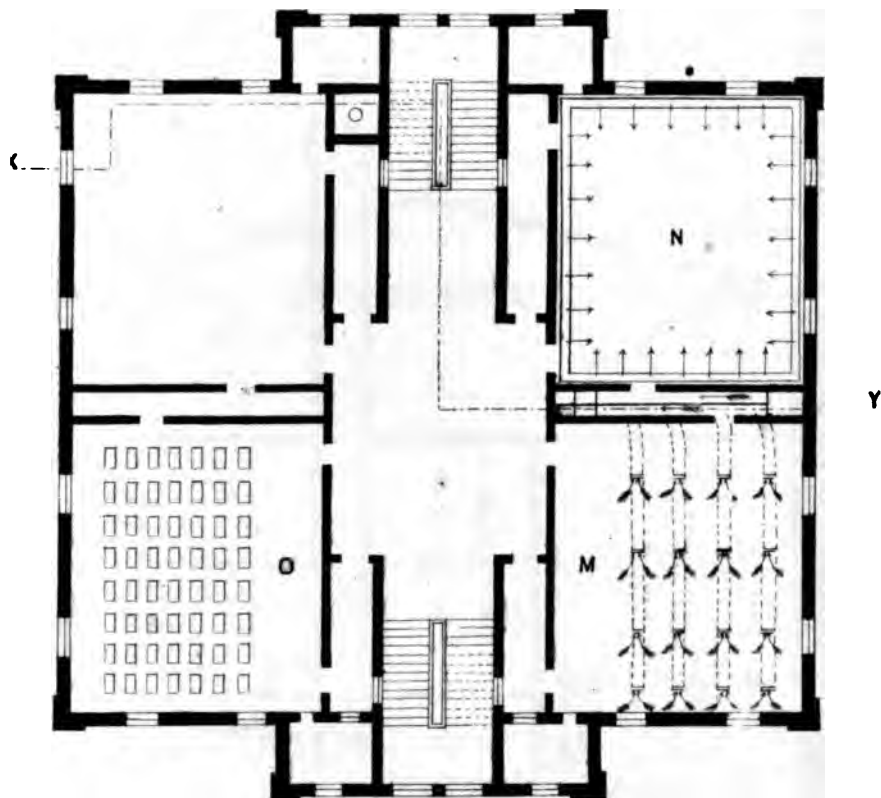


FIG. 4.
PLAN OF 1ST AND 2ND FLOORS.



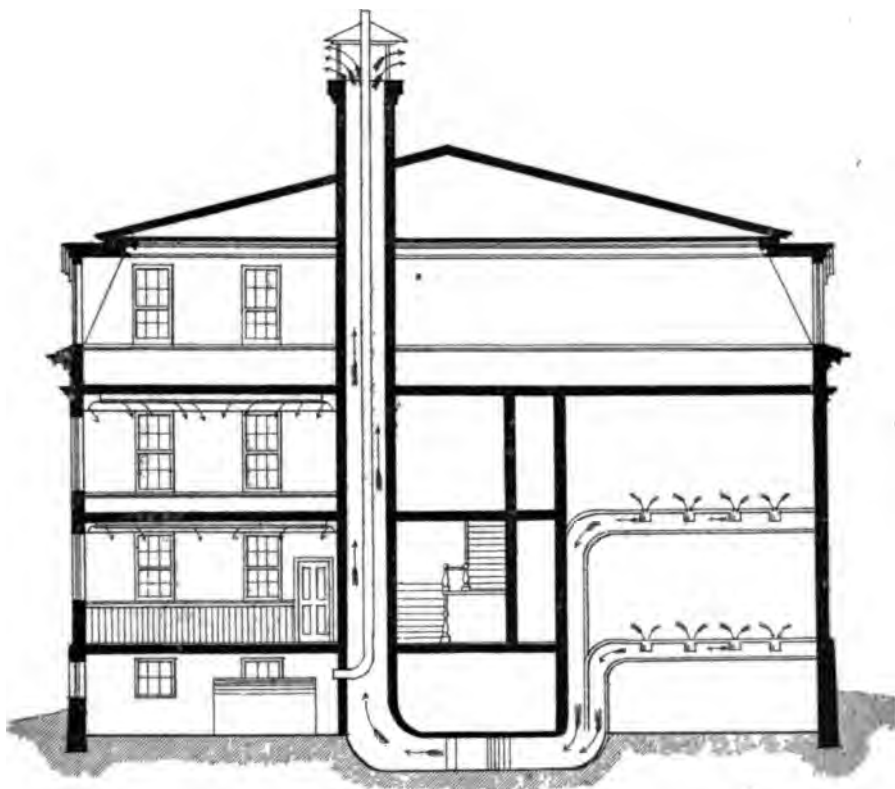


FIG. 5.
TRANSVERSE SECTION.

FIG. 6 . HOT & COLD AIR PIPES.



FIG. 7 . HOOD FOR FOUL AIR REG.

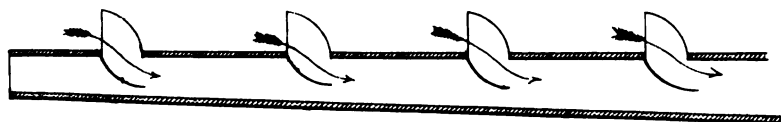
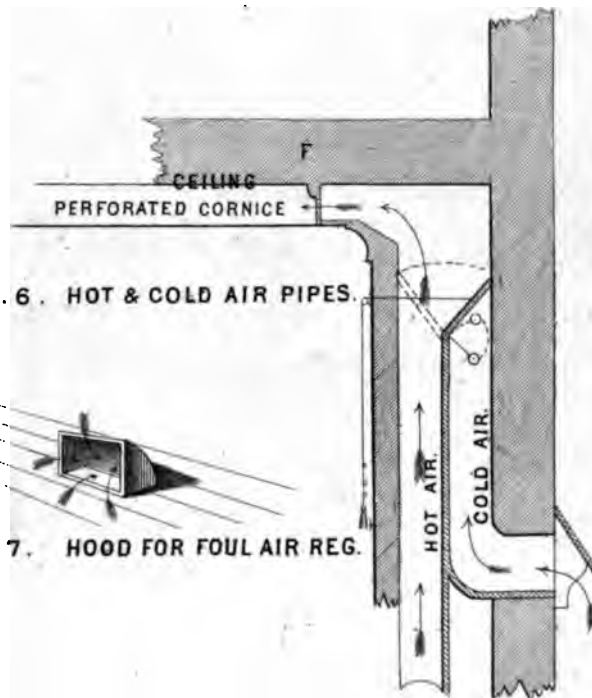


FIG. 8 .
HORIZONTAL DUCT



THE WATER OF MYSTIC POND

AND ITS

SOURCES OF SUPPLY.

EXAMINATION OF THE WATER OF MYSTIC POND, AND OF ITS SOURCES OF SUPPLY.

The pollution of streams by industrial establishments and by the sewage of towns, has been several times during the past year brought to the notice of the State Board of Health.* Judging from the history of still more densely populated manufacturing districts in other parts of the world, the general subject will continue to claim the attention of the people of Massachusetts for many years to come. As the interests of life and health become more definite and more valued, and as manufactories and population grow and multiply, the apparent conflict in this respect between health and industry will yearly become more evident. It is our duty, if possible, to show that these important interests are not irreconcilable, and to give a word of warning in season to prevent their relations from being forgotten until it is too late to remedy the omission except at enormous cost.

It was thought best, for the present year, to take a single instance of alleged pollution of a stream, and examine it thoroughly. The selection of Mystic Pond and the sources of its supply was made chiefly in consequence of information received from a gentleman familiar with the locality, who requested us to investigate the "condition of the streams and ponds in the town of Woburn as affecting its inhabitants, and also the supply of the Charlestown water-works. The chief occupation of Woburn is that of tanning, and many of the establishments are placed near to some small stream which receives the filth from the beam-house where the hides are scraped and cleaned. These streams flow southward through Winchester, and supply the Mystic Pond and Charlestown water-works. There are also two glue factories, and a bone-

* At Stoneham and Melrose as well as at Woburn.

boiling establishment, which are far worse than the tanneries. The offensive odor of one of these streams has often been a source of complaint among those inhabitants who live south of Railroad Street, in a thickly-settled part of the town. This nuisance may be remedied without pecuniary loss, for the filth of these brooks may all be used as a fertilizer, by being collected in vats at the tanneries. This has already been done at one large establishment in Winchester, the tank being cleaned out often, and its contents distributed upon neighboring farms."

Our correspondent also refers to the foul condition, at times, of Horn Pond, the waters of which flow into Mystic Pond; but, as will subsequently appear, they were not so found during the past summer.

The chemical examination of the waters of Mystic Pond and its tributaries was committed to Mr. William Ripley Nichols, Assistant Professor of General Chemistry at the Massachusetts Institute of Technology. In company with Mr. Nichols, the Secretary visited and selected the points at which specimens of water were taken on the first of April. A second set of specimens was taken on the ninth of August, after a drought so prolonged that some of the smaller streams of April 1st had disappeared. The report of Mr. Nichols is as follows:—

MASS. INSTITUTE OF TECHNOLOGY, }
BOSTON, September 15th, 1870. }

GEORGE DERBY, M. D., *Secretary of Mass. State Board of Health:*

DEAR SIR:—The examination of the waters supplying Mystic Pond was made at two different dates. The first set of specimens was taken April 1st, 1870. The description and locality of these waters, which are denoted by *Arabic* numerals in the Table, are as follows:—

No. 1.—A sample taken from a brook in North Woburn, about half a mile above Eaton's Chemical Works, at a point where the brook crosses the Lowell Railroad. Yellow.

No. 2.—From the same stream, just below the chemical works. Colorless.

No. 3.—From the surface of Horn Pond at its outlet. The pond was full and a rapid current setting out. Slightly turbid. No disagreeable odor or taste.

No. 4.—From a small stream draining a number of tanneries and emptying into the outlet of Horn Pond, at some distance from the

pond. The sample was taken at a point near its junction with said outlet, where the stream was flowing over numerous rocks, producing much foam. A disagreeable odor was apparent in its vicinity.

No. 5.—From the upper end of the reservoir, near "Bacon's Bridge."

No. 6.—At the dam opposite Whitney's Machine-shop, Winchester.

No. 7.—From the same stream as No. 4, as it issues from the Cummings Tannery, where it is scarcely more than a drain. There was a rapid flow.

No. 8.—Mystic water drawn in Charlestown, April 5th.

No. 9.—Cochituate water drawn in the Laboratory of the Institute of Technology.

The second collection was made August 9th, after a very long period of dry weather. The ponds were moderately low and covered near their margins with a growth of aquatic plants. I observed no *green scum* or unpleasant odor. The draining stream from which Nos. 4 and 7 were taken in April, was perfectly dry. These samples, indicated in the Table by *Roman* numerals, were as follows:—

No. I.—From a brook in Cummingsville, Woburn, above Bacon's Patent Leather Factory. Small brook in a cow-pasture, with little flow.

No. II.—From the same stream near its entrance into Horn Pond. The ground, marsh meadow; the brook of considerable size, flowing sluggishly; the water clear.

No. III.—From Horn Pond. Same locality as No. 3. Flow from pond slow; slightly turbid.

No. IV.—From a stream in East Woburn, at the place where it crosses Washington Street. Quite clear.

No. V.—Opposite Whitney's Machine-shop, Winchester. Same locality as No. 6.

No. VI.—From Bacon's Bridge. Same locality as No. 5.

No. VII.—Mystic water drawn in Charlestown, August 13th.

No. VIII.—Cochituate water from upper (eastern) part of lake, near the shore, August 31st.

No. IX.—Cochituate from Laboratory of Institute of Technology.

No. X.—The same.

No.	LOCALITY. (See description preceding.)	DATE.	No. of cubic cen- timetres of per- manganate of pot- ash dissolved in 1 litre.	No. of cubic cen- timetres of solu- tion of 100 parts of water.	SOLID RESIDUE AT 100° C.		LOSS OF GASTLE IGNITION.		CHLORINE.	Reaction for Nitrites.	Reaction for Sulphates.
					Parts in 100,000.	Grains in U. S. Gallon.	Parts in 100,000.	Grains in U. S. Gallon.			
1.	Brook, North Woburn,	April	97.7	2.75	3.59	2.10	1.35	0.79	Slight.	None.	Very slight.
2.	Same, below Chem. Works,	1,	92.4	5.1	11.16	6.51	1.33	0.77	Decided.	None.†	Very decided.
3.	Horn Pond,	1,	16.8	9.3	6.9	3.55	1.67	0.97	Moderate,	Very slight.	Very slight.
4.	Tannery Stream,	1,	30.0	4.0	18.46	10.77	3.23	1.88	Very decided,	Distinct.‡	Decided.
5.	Bacon's Bridge,	1,	18.2	3.5	-	-	-	-	Slight,	Slight.	Slight.
6.	Whitney's Machine Shop, . .	1,	15.8	3.5	-	-	-	-	Slight,	Slight.	Slight.
7.	Tannery Stream,	1,	35.6	5.85	-	-	-	-	Very decided,	-	Very decided.
8.	Mystic Water, Charlestown,	5,	14.8	4.00	7.38	4.30	1.95	1.13	Moderate,**	Slight.‡	Very slight.
9.	Cochituate,	5,	17.4	-	-	-	-	-	Slight, **	Very slight.‡	None.
		6,	16.8	-	-	-	-	-	-	-	-
I.*	Cummingsville,	Aug.	5.6	4.2	6.30	3.68	1.62	0.95	Parts in 100,000.	Grains in U. S. Gallon.	-
II.	Horn Pond Inlet,	9,	10.5	6.9	13.48	7.87	2.84	1.66	0.673	0.393	None.
III.	Horn Pond (3),	9,	16.4	5.9	8.58	5.1	2.40	1.40	3.215	1.819	Distinct.
IV.	East Woburn,	9,	21.7	5.5	-	-	-	-	1.673	0.977	None.
V.	Whitney's Machine Shop (6),	9,	20.4	6.6	-	-	-	-	1.154	0.674	None.
VI.	Bacon's Bridge (5),	9,	19.4	6.8	9.14	5.24	2.54	1.48	1.942	1.134	None.
VII.	Mystic, Charlestown (8), . .	12,	11.4	-	10.42	6.8	3.00	1.75	1.981	1.156	Slight.
VIII.	Cochituate Lake,	31,	-	-	8.00	4.67	2.20	1.28	1.654	0.965	None.
IX.	Cochituate, Boston,	10,	-	3.8	6.66	3.88	-	-	-	-	-
X.	Cochituate, Boston,	Sept. 15,	-	-	-	-	-	-	0.372	0.217	-

* Between Nos. I. and II. there is a morocco factory.

† Slight reaction for phosphates; moderate reaction for nitrates.

** Compare with Nos. VII. and X.
‡ Slight reaction for nitrates.† Slight reaction for phosphates.
‡ Very slight reaction for nitrates.

Explanation of the Table.

The results are calculated both in terms of parts in 100,000, and of grains in a United States gallon of 58372.1754 grains (231 cubic inches), with the exception of those in the first two columns which are to be regarded simply as *comparative*.

The *permanganate* test was applied to the waters the day after they were collected, by adding to the water, after acidulation with sulphuric acid, a dilute solution of permanganate of potassium until a red color was produced which lasted ten minutes. [1,020 cubic centimetres of this solution oxidized 0.63 gram. crystallized oxalic acid.] For this test and for the determination of the dry residue, the waters were allowed to settle and were then drawn off from any sediment.

The *hardness* was determined by adding to 100 cubic centimetres of the water a dilute alcoholic solution of soap, until a permanent froth (lasting three minutes) was obtained. [34.2 cubic centimetres of the soap solution were required for 100 cubic centimetres of a solution containing 0.02775 gram. chloride of calcium.]

The test for nitrites was applied by adding to equal quantities (75 or 100 cubic centimetres) of the waters a drop or two of dilute sulphuric acid and a small quantity of iodide of potassium and starch; the amount of the blue coloration of the liquid was then observed.

In the second set of specimens, the chlorine was determined volumetrically by the use of a standard solution of nitrate of silver.

The map is traced from the "Map of Boston and its Environs," published by Baker and Tilden, Boston, 1867.

Respectfully submitted,

(Signed)

WM. RIPLEY NICHOLS.

The conclusions reached by this investigation may be thus expressed :—

The permanganate test, showing the comparative amounts of readily oxidizable material contained in the water, is of a certain significance as marking the impurity of the tannery stream of April 1st, Nos. 7 and 4. Even at the latter point, where the current was swift and broken, it had not cleared itself of the foul character acquired a half mile above. But the permanganate test alone is not conclusive, since oxidizable substances in water may not be harmful, and we see this in the amount

found present in the specimen taken from the brook in the woods of North Woburn (No. 1) above all the sources of pollution. It was here due without doubt to vegetable matter derived from the banks or from fallen leaves. Horn Pond and the Winchester reservoir show no foulness by this test; although it will be observed that the amount of permanganate required increases in the second examination all the way along from Cummingsville to the reservoir. Here it requires less, and at Charlestown the water is found in this respect to be even more free from oxidizable material than the water of Boston.

The test for nitrites indicates the amount of nitrogenous matter undergoing decomposition; and the test for nitrates the amount of the same material which has undergone complete oxidation. The tannery stream (Nos. 7 and 4, April 1st) and the inlet of Horn Pond give evidence of the presence of such impurity.

As regards chlorine, it is agreed by chemists that all waters near the sea must contain a certain proportion. It is conveyed in the air in the form of common salt and deposited upon both earth and water. A familiar evidence of this general fact is found in the greater need of supplying salt to animals in the inland districts. It is also not improbable that Mystic Pond may contain some traces of sea-salt left by the ocean when it had access to its waters.

With these reservations the presence of any but minute amounts of chlorine may be taken as evidence that it has been caused by some form of impurity added to the water by man.

Chlorine increases quite steadily in amount from Cummingsville to the reservoir; the great and exceptional increase at the inlet of Horn Pond being due to the morocco factory just above. In the reservoir, uniting with other sources of supply, it is diluted, so that, when it reaches Charlestown, the amount is found to be about the same as at the outlet of Horn Pond,—considerably greater than in the Boston water.

The soap test is of practical value as denoting the amount of lime salts, or of other salts which harden the water.

Finally, it may be said that in so far as the Mystic water as delivered at Charlestown is concerned, the fears naturally entertained by those who were familiar with the foul conditions

through which a small portion of it is known to pass are not confirmed.

The impurities derived from the tanneries, when mixed with the great mass of water coming from sources of unquestionable purity, would probably, by the effect of dilution alone, make but little change in its general character. But there is a purifying influence constantly at work in the power which water possesses when freely exposed to air, and particularly when moved as in a running stream of ridding itself of oxidizable material. Water absorbs oxygen very freely, so that the gases held by water contain a larger proportion than the atmosphere.

The proportion of oxygen contained in the gases of ordinary water is as 33 in 100 parts by volume, while in air it is but 21.

These two influences, dilution and oxidation, are sufficient at present in the case of Mystic water to render it as received at Charlestown, Somerville and East Boston unquestionably good and wholesome.

That in the reaction for chlorides, nitrites and nitrates, and calcareous salts, it is not quite equal to the water of Boston, is not to be regarded as to its discredit, since the water of Cochituate Lake is of exceptional excellence.

The future of Mystic water depends upon the care which shall be taken to keep it free from additional impurity. When the stream which disappeared in the dry season between April and August began to flow again, it must have washed into Mystic Pond a large part of the refuse material which had accumulated about the tanneries on its banks. When, instead of twenty or thirty tanneries and glue factories and chemical works, there may be hundreds of such establishments on the little streams flowing into Mystic Pond, there will be reason to fear a dangerous pollution of its waters. Before that time arrives it is to be hoped that some economical and safe way may be universally adopted, not only to prevent the fouling of water, which like air should be kept pure for the benefit of all, but to return decomposing material to the land which may rightfully claim it as its due.

What we recognize as filth is only "matter in a wrong place."

The water of Charlestown, derived from Mystic Pond, stands thus as compared with the water of other cities :—

Numbers representing grains in United States gallon.

	Solid residue.	Inorganic matter.	Organic and volatile.
Charlestown,*	4.48	3 27	1.21
Boston,†	2.45	1.80	0.65
New York,‡	4.78	4.11	0.67
Philadelphia,§	4.08	4.04	0.04

Numbers representing parts in 100,000.

Charlestown,*	7.69	5.62	2.07
Boston,†	4.20	3.08	1.12
New York,‡	8.20	7.07	1.15
Philadelphia,§	6.99	6.93	0.06

* Prof. W. R. Nichols. Mean of results in preceding report.

† Prof. W. R. Nichols. Examination of Boston water, made at Institute of Technology, December, 1870.

‡ Prof. Chandler. 1870.

§ Prof. Boye. 1852. "Report of the Watering Committee."

AIR, AND SOME OF ITS IMPURITIES.

AIR, AND SOME OF ITS IMPURITIES.

No one can study the causes of disease without being convinced of the infinite importance of pure air to the preservation of health. This general truth meets us at every turn. Sometimes, as in the case of air spoiled by respiration, the reason is obvious enough to every one who understands the changes which take place in breathing; certainly, in so far as the interchange of oxygen and carbonic acid is concerned.

In other cases, as when air seems to be the vehicle for the transfer of the hidden poison of the zymotic diseases, it is, as yet, obscure. We do not propose, at present, to enter on this dangerous (because, as yet, partly hypothetical) ground. Allusion to it will be found in many pages of the present volume. Indeed, in any study of the causes of disease, at the present day, it is impossible to ignore it, however anxious we may be to keep within the strict bounds of scientific truth. In some way, as yet but imperfectly understood, the organic matter in air seems either to be or to contain the agent by which certain changes are impressed upon the blood in the lungs, which changes become the proximate cause of the phenomena of typhoid fever, and scarlet fever, and measles, and many other of our most destructive maladies. Whether this organic matter be waste tissue which has once had life and has now undergone some metamorphosis incident to decay, or whether it be living organism, seed, germ, spore or vital radicle of any sort, no one yet knows, or perhaps we should say, that no one who thinks he knows can yet prove his knowledge. The search for this foe to our health, for this hidden something which works with such fatal power, is keen. The chemists, the microscopists, the natural philosophers are all aiding in the study of its origin, its character, and the means of separating it from the air which all believe conveys it. It has even become, through the

popular teachings of Professors Tyndall and Huxley, a subject of rather general discussion during the past year. It should, however, never be forgotten that it is to the unobtrusive labors of men devoted to science like Dr. R. Angus Smith of England, labors pursued unremittingly for a quarter of a century, and modestly published in scientific reports, that we know all, or nearly all which is available in speculations on this obscure subject. The eloquent men who have recently interpreted the facts of Angus Smith and Pasteur and Beale and Hallier and Sanderson to the general public in a way to arrest the attention of the busy world, have in this respect done good service, but they have added almost nothing to the stock of existing knowledge.

We would gladly contribute our proportion of exact observation, however small it may be, to this great subject so full of interest and promise.

During the present year, careful note has been made of the proportion of carbonic acid contained in the air of enclosed places of various sorts, and also of the outer air at different seasons of the year. We hope to continue this line of research in future years, and, by the aid of chemists and microscopists, to determine the amount of organic matter which the air may hold under various circumstances, and to learn, if possible, something of its nature.

Although carbonic acid is not now generally regarded as a poisonous gas, but rather as an obstructor of respiration, and therefore impeding all vital processes, its amount in crowded and ill-ventilated rooms is a tolerably correct measure of the degree of impurity there present, and is specially worthy of observation as an index of the proportion of dangerous material coming from the waste of the body, with which, under such circumstances, it is always associated.

The amount of carbonic acid found in the fresh outer air will furnish a standard of the quality of the normal air of Massachusetts, and may also lead to a better knowledge of some of the peculiarities of the climate of our State in comparison with that of other countries.

In illustration of the value of the determination of very small amounts of impurity in air, we quote the following remarks of Dr. R. Angus Smith, from a paper on "Chemical

Climatology," in the *Scottish Meteorological Journal*, January, 1870:—

"Some people will probably inquire why we should give so much attention to such minute quantities,—between 20.980 and 20.999 of oxygen,—thinking these small differences can no way affect us. A little more or less oxygen might not affect us, but supposing its place occupied by hurtful matter, we must not look on the amount as too small. Subtracting 0.980 from 0.999 we have a difference of 190 in a million. In a gallon of water there are 70,000 grains; let us put into it an impurity at the rate of 190 in a million; it amounts to 13.3 grains in a gallon. This amount would be considered enormous if it consisted of putrefying matter, or any organic matter usually found in waters, but we drink only a comparatively small quantity of water, and the whole thirteen grains would not be swallowed in a day, whereas we take into our lungs from one thousand to two thousand gallons of air daily. The detection of impurities in air is, therefore, of the utmost importance; and it is only by the finest methods that they can be ascertained in small quantities of air, even when present in such quantity as to prove deleterious to health." * * * * * "If, by inhalation, we took up at the rate of thirteen grains of unwholesome matter per day,—half a grain per hour,—we need not be surprised if it hurt us. Such an amount is an enormous dose of some poisons, and yet this is not above one two-thousandth part of a grain at every inhalation. It is marvellous what small amounts may affect us, even when, by repeated action, they do not cumulate as certain poisons do. The carbonic acid numbers might have been used for this illustration, instead of the oxygen numbers, with the same result."

The examinations of air for carbonic acid were made at the Massachusetts Institute of Technology, under the direction of Professor Frank H. Storer, by Mr. A. H. Pearson of Haverhill. The results are as follows:—

A.—OUTER AIR, IN BOSTON.

LOCALITY.	Percentage of Carbonic Acid, by Volume.	Date— 1870.	Time.	Temperature. Centigrade.	Barometer. Inches.	Remarks.
	.04560	Mar. 17,	11.00 A. M.,	Deg. —3.5	29.880	Cloudy, wind N. W.
	.03194	Apr. 1,	8.45 "	9	30.872	Clear, wind N. E.
	.03894	8,	8.45 "	9	30.872	" "
	.03988	8,	9.40 "	13	30.184	" "
	.04449	8,	9.40 "	13	30.184	" "
	.04218	8,	9.40 "	13	30.184	" "
	.03798	13,	11.00 "	14	30.000	Clear, wind N.
	.04435	13,	11.00 "	14	30.000	" "
	.04280	14,	2.35 P. M.,	25	30.016	Clear, wind S. W.
	.04292	14,	2.35 "	25	30.016	" "
	.04999	28,	2.20 "	23	29.872	Cloudy, wind S. W.
	.04903	28,	2.20 "	28	29.872	" "
	.04493	May 3,	8.30 "	14	29.386	Clear, wind N.
	.03394	12,	2.45 "	22	29.852	After storm; light clouds; wind S. W.
	.03561	12,	2.45 "	22	29.852	After storm, light clouds; wind S. W.
	.02905	17,	10.45 A. M.,	14	30.170	Cloudy, wind N. E.
	.03563	18,	4.05 P. M.,	22	30.386	Clear, wind S. W.
	.02969	19,	10.50 A. M.,	25	30.244	" "
	.02586	30,	3.40 P. M.,	20	30.264	Clear, wind S. E.
	.03139	18,	3.15 "	20.5	30.336	Clear, wind S. W.
	.03371	19,	1.30 "	28	30.212	" "

Newbury Street, near Institute Technology,

Park Street, near Tremont,

Newbury Street,

Public Garden,

Cupola of State House,

Clarendon Place, near Berkeley Street,

II.—ROOMS AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

LOCALITY.	Percentage of Carbonic Acid, by Volume.	Date— 1870.	Time.	Temperature. Centigrade.	Barometer. Inches.	Remarks.
Small "weighing-room," Laboratory Institute Technology, . . . . .	.13205	Mar. 15,	3.00 P. M.,	Deg. 22	80.190	-
	.13041	15,	3.00 "	22	80.190	-
Drawing-room, Second Year, Institute Technology, . . . . .	.08836	16,	9.40 A. M.,	14	29.760	Wind N. E.
	.08416	16,	9.40 "	14	29.760	" "
	.05693	16,	5.00 P. M.,	15	29.760	" "
	.05551	16,	5.00 "	15	29.760	" "
Room 11, after recitation, Institute Technology, . . . . .	.09762	17,	1.15 "	21	29.880	-
	.08929.	17,	1.15 "	21	29.880	-

III.—AIR OF SCHOOL-ROOMS IN BOSTON.

Grammar Schools.				Deg.		
Myrtle Street, . . . . .	.13431	Mar. 24,	10.25 A. M.,	23	80.200	-
Dartmouth Street, . . . . .	.13659	24,	10.30 "	23	80.200	-
Hawkins Street, . . . . .	.12912	25,	10.30 "	18	80.480	-
Tremont Street, . . . . .	.09748	29,	10.20 "	21	29.906	-
Waltham Street, . . . . .	.14335	29,	3.00 P. M.,	28	29.950	-
Common Street, . . . . .	.12111	29,	3.30 "	18	29.950	-
West Springfield Street, . . . . .	.17686	30,	10.05 A. M.,	18	80.260	-
Blossom Street, . . . . .	.10164	31,	10.25 "	21	80.396	-
North Bennet Street, . . . . .	.19037	Apr. 5,	10.30 "	22	29.900	-
Richmond Street, . . . . .	.17887	6,	10.15 "	19	29.920	-
	.17781	11,	10.10 "	20	80.196*	-

Anderson Street, . . . . .	.08570	Apr. 12,	10.10 A. M.,	23	29.648	-
Northampton Street, . . . . .	.18622	18,	10.10 "	22	29.982	-
Tyler Street, . . . . .	.12586	18,	3.35 P. M.,	20	29.850	-
South Street, . . . . .	.17598	May 10,	10.15 A. M.,	23	30.114	-
<i>Primary Schools.</i>						
Appleton Street, . . . . .	.11092	Mar. 25,	3.15 P. M.,	20	30.460	-
Hanover Street, (Station-house,) . . . . .	.14296	28,	10.30 A. M.,	20	29.556	-
110 Merrimack Street, . . . . .	.18187	28,	11.15 "	20	29.556	-
Poplar Street, . . . . .	.11173	Apr. 6,	11.15 "	20	29.900	-
North Bennet Street, . . . . .	.16824	6,	10.25 "	20	29.920	-
Richmond Street, . . . . .	.08101	11,	10.20 "	22	30.196	-
Phillips Street, . . . . .	.08971	12,	10.20 "	22	29.648	-
West Concord Street, . . . . .	.13999	18,	10.25 "	21.5	29.982	-
Tyler Street, . . . . .	.11015	18,	3.50 P. M.,	19	29.850	-
Newbern Place, . . . . .	.15541	19,	11.35 A. M.,	23	29.796	-
Warrenton Street, . . . . .	.14575	19,	11.50 "	22	29.796	-
Suffolk Street, . . . . .	.10618	19,	3.35 P. M.,	22.5	29.750	-
Cooper Street, . . . . .	.19927	21,	9.55 A. M.,	22	29.888	-
Thacher Street, . . . . .	.17292	21,	10.10 A. M.,	23	29.888	-
Sheafe Street, . . . . .	.18692	21,	3.40 P. M.,	22.5	29.856	-
Snelling Place, . . . . .	.16056	21,	3.55 "	19	29.856	-
Genesee Street, . . . . .	.16082	22,	9.50 A. M.,	23	30.050	-
Way Street, . . . . .	.12284	22,	10.15 "	23	30.050	-
Groton Street, . . . . .	.14507	25,	11.20 "	20	30.092	-
Rutland Street, . . . . .	.11663	25,	11.45 "	22	30.092	-
Hudson Street, . . . . .	.13024	May 9,	3.40 P. M.,	18	29.856	-
Common Street, . . . . .	.07732	9,	3.55 "	18	29.856	-
East Street, . . . . .	.16988	10,	10.05 A. M.,	22.5	30.114	-
Chardon Street, . . . . .	.09934	11,	10.15 "	22.5	30.084	-
Blossom Street, . . . . .	.12708	11,	10.50 "	21	30.084	-

IV.—AIR OF HALLS, &C., IN BOSTON.

LOCALITY.	Percentage of Carbonic Acid, by Volume.	Date— 1870.	Time.	Temperature. Centigrade.	Barometer. Inches.	Remarks.
Musie Hall, Tremont Street, . . . . .	.14045	May 4,	4.05 P. M.,	Deg. 25	29.576	-
Low tenement-house, known as the "Crystal" Palace, Lincoln Street, . . . . .	.09530	17,	2.30 P. M.,	23	30.242	-
Open air, in rear of above. . . . .	.03976	17,	2.50 "	15	30.242	-
Hall of Y. M. C. U., 300 Washington Street, .	.15239	Apr. 27,	9.05 "	26	30.060	-
Municipal Court-Room, Court Street, . . .	.12047	20,	1.30 P. M.,	23	29.784	-
Office of Secretary of State, State House, .	.08014	Mar. 22,	2.45 "	24	29.892	-
Printing-Office, 79 Milk Street, . . . . .	.16183	Apr. 4,	3.30 "	20	29.724	-
Salwyn's Theatre, . . . . .	.14438	11,	9.00 "	23	29.952	-
St. Paul's Church, . . . . .	.03929	15,	11.00 A. M.,	21	30.292	-
Public Library, waiting-room, . . . . .	.13666	Mar. 19,	2.30 P. M.,	20	30.150	-
	.13747	19,	3.45 "	21.5	30.150	-
	.13552	Apr. 20,	7.50 "	23	29.784	-

NOTE.—The method employed in the above analyses was the one generally known as Pettenkofer's. It consists in acting upon a known volume of air, with a certain quantity of standard baryta-water, and so removing the carbonic acid as carbonate of baryta.

After acting upon the air for about half an hour, the baryta solution is poured into a cylinder, allowed to deposit, with exclusion of air, the carbonate of baryta which has been formed, and then the free baryta remaining in solution is determined with a standard oxalic acid solution.

The difference between the amounts of oxalic acid required to neutralize the baryta, before and after the operation represents the carbonate of baryta formed, and consequently the carbonic acid present.

The baryta solution is prepared by dissolving seven grammes of hydrate of baryta in one litre of water; one cubic centimetre of this solution corresponds to about one milligramme of carbonic acid. The precise strength of the solution is determined by means of oxalic acid as described below. In the above experiments 1.087 cubic centimetres of the baryta solution corresponded to one cubic centimetre of oxalic acid solution.

The oxalic acid solution is prepared by dissolving 2.8636 grammes of pure oxalic acid in water, and diluting the solution to the volume of one litre. One cubic centimetre of this solution corresponds to one milligramme of carbonic acid.

The strength of the baryta-water is determined by running the oxalic solution from a burette into a certain quantity of the baryta-water, until a drop of the mixture fails to give a brown ring on delicate turmeric paper.

It will be observed that all the examinations of air by Mr. Pearson were made in the spring of 1870.

Another series was made for the Board of Health in winter, when the average temperature of the outer air was at about the standard of our three coldest months—a little below the freezing point of water. The following record shows the results of examination of the outer air for carbonic acid made at the Laboratory of Harvard University, Cambridge, by Mr. H. B. Hill, Assistant in Chemistry.

While this Report is passing through the press Mr. Hill sends us also a record of three examinations of air for carbonic acid, made in a recitation room of Harvard College.

OUTER AIR, IN CAMBRIDGE.

LOCALITY.	Percentage of Carbonic Acid, by Volume.	Date— 1870.	Time.	Temperature. Centigrade.	Barometer. Eng. Inches.	Remarks.
College Yard, 20 feet north of Boylston Hall,	0.0875	Dec. 29,	4.00 P. M.,	Deg. -5	29.457	{ Cloudy, snow during previ- ous 24 hours.
	0.0876	30,	12.00 M.,	-9	29.973	Wind S. W., fair.
	0.0808	30,	4.00 P. M.,	-7	29.973	Wind S., cloudy.
	0.0844	31,	11.00 A. M.,	+3	29.685	Wind S. W., fair.
	0.0864	31,	2.00 P. M.,	+6	29.626	Wind S.
		1871				
	0.0843	Jan. 2,	3.30 P. M.,	+4	29.649	Wind S. W., cloudy.
	0.0810	3,	11.00 A. M.,	0	30.063	Wind S. W., clear.
	0.0811	3,	2.30 P. M.,	-1	30.000	-
	0.0831	4,	11.00 A. M.,	-5	30.240	Wind W., clear.
	0.0832	4,	3.30 P. M.,	-5	30.264	-
	0.0833	5,	9.00 A. M.,	-3	30.158	Wind S. E., cloudy.

AIR OF A RECITATION-ROOM,* HARVARD COLLEGE.

LOCALITY.	Percentage of Carbonic Acid, by Volume.	Date— 1871.	Time.	Temperature. Centigrade.	Barometer. Eng. Inches.	Remarks.
Recitation Room of Boylston Hall, . . .	0.0883	Jan. 10,	12.00 M.,	Deg. 20	30.130	After one hour's recitation.
	0.0831	17,	5.00 P. M.,	20	30.028	After 4 hour's recitation.
	0.0613	17,	6.00 " "	24	30.028	After 14 hours' recitation.

* Air taken fifteen minutes after the recitation was over.

Mr. Pearson's twenty-one observations of the outer air of Boston in *spring* give an average of 385 parts of carbonic acid in a million. Mr. Hill's eleven observations of the outer air of Cambridge in *winter* give an average of 337 parts of carbonic acid in a million.*

In the forty school-rooms examined by Mr. Pearson, the average proportion of carbonic acid found was 1,393 parts in a million, or nearly four times the normal amount existing in the outer air. The highest was 1,993, and the lowest 773 parts in a million.

It would not be fair to regard these figures as representing the amount of ventilation in different schools, as the examinations were made sometimes near the close of a session, and sometimes immediately after a recess when the windows had been open. The weather would also greatly influence the activity of air currents. But the average may be taken as a correct statement of the quality of air in the Boston schools.

The following letter from Mr. Charles Stodder, of Boston, an accomplished microscopist, will show what he was requested to do for the Board of Health. Although his results are inconclusive and almost completely negative, it is thought right to publish an account of this honest effort to reach the truth.

The presence in air of objects too minute for identification, leaves the whole question open for future investigation and discovery. The molecular movement of particles devoid of life is clearly exhibited by Mr. Stodder to whoever will examine his specimens.

The examination of dust deposited on a beam eight or ten feet from the floor, in a large room at the Springfield Armory, shows how metals may be floated about in the air, and if metals surely anything else in particles equally minute.

* Dr. Angus Smith (1869) gives the following amounts of carbonic acid found in the open air in England:—

Hills above 3,000 feet high,	336 parts in a million.
between 1,000 and 2,000 feet high,	334 " "
below 1,000 feet high,	337 " "
At the bottom of the same hills,	341 " "
Streets of London, (summer,)	380 " "
London Parks,	301 " "
On the Thames, at London,	343 " "
Manchester Street, (ordinary weather,)	403 " "
During fogs in Manchester,	679 " "

DR. GEORGE DERBY, *Secretary of the State Board of Health*:

DEAR SIR:—So much interest had been created in the medical profession and among microscopists, by the various reports of the microscopical investigation of the dust floating in the air, especially by the surprising results said to have been obtained by Mr. Dancer, of Manchester, England, as reported by Dr. Angus Smith, and by the widely published lecture of Prof. Tyndall, on “Dust and Disease,” that it was with pleasure I received your request to search for the microscopic contents of the air of Boston.

Dr. Angus Smith obtained his examples by putting a small quantity of water into a large bottle, and shaking the bottle, repeating the process many times, with new volumes of air and the same water. This appeared to me to be an unsatisfactory mode, and I devised an apparatus by which I could pass some thousands of measured volumes of air through one volume of water, thus, as I then thought, completely washing the air which passed through. Yet when we reflect that the bubbles of air in the water, though they may be only the one-hundredth, or even half an hundredth of an inch in diameter, are of large size when compared with the particles of matter in the air, many of which are so small as one-one-hundred thousandth ($\frac{1}{100,000}$) of an inch, we see that such may escape contact with the water, and thus elude observation. Still, the substances detained by the water are probably nearly all the larger particles, and representations in kind, if not in quantity, of those floating in the atmosphere.

My first experiment was made with filtered Cochituate water, which to the eye appeared perfectly clear and free from foreign matter. In this I found such objects as will be hereafter mentioned, but especially scaly particles of apparently organic origin, and numerous minute, translucent spherical or granular bodies,—such as I suppose Mr. Dancer called germs. Something created suspicion that the water was not pure. A little of it was evaporated on a glass slide, and examined with the microscope. It had left a deposit of the same scaly and spherical particles. Other observers had used distilled water. I procured some from two sources, which had been distilled some weeks, but kept with care; both proved more impure microscopically than the filtered water. This put a stop to experiments for several weeks until a new supply of fresh distilled water could be obtained. A friend prepared some expressly for me with the utmost care, with the best apparatus. To my surprise, a drop of this water, evaporated, left a deposit visible to the naked eye, and, under the microscope, showing (as you yourself have seen) abundance of the same scales and granules.

This result put an end to this mode of investigation, and throws a cloud of suspicion on all reported researches in this line, when water was the medium used.* My object in the use of water was, that if spores, germs or eggs were found, their development and growth might be watched, and, if possible, their nature might be ascertained, or at least it might be determined that they really were spores or germs, believing as I do, that mere particles of matter have been taken for organisms. Other modes of collecting the dust of the atmosphere are by taking the deposited dust of rooms, or by causing a current of air to impinge against a surface of glass smeared with glycerine, when a portion of the floating particles will be caught by the viscid surface. In these methods, we can judge of the nature of the dust only by its present appearance,—there will be no growth. Both of these methods I have tried, but not so extensively as is desirable; my observations have been entirely on the air in a room in Dover Street, and that of the yard attached, a locality tolerably free from the dust of the street, and with but little vegetation in the neighborhood. I have used a Tolles' microscope with object glasses of "unsurpassed excellence," magnifying from 250 to 1,200 diameters.

The dust collected in the yard varied but little in its contents from that in the room. I have found scales resembling dead epithelial scales, filaments of cotton, wool and flax, woody fibres, all abundant; some pollen grains, scales of moths' wings, hairs and parts of insects, starch grains, grains of inorganic matter, sand, &c. Such things are reported by all observers; besides, some of them report immense numbers of spores or germs. I find great numbers of particles; I cannot say that they are germs or are not, that they are organisms or are not, or even that they are organic or inorganic. Some observers have used a power of 250 or 300 diameters, perhaps poor quality at that, found something, and rushed to the printer. Any microscope shows objects (in such collections) too minute to be identified. Increase of "power" may identify them, if the instrument is a good one, but it only brings into sight another set, in the same category; another increase of power repeats the process with a third set, and so it may continue *ad infinitum*. I doubt if the best microscopes (inferior ones are out of the question) can determine whether a minute particle is, I will not say an organism, but whether it is organic matter. Some observers have apparently considered motion an evidence of life. Certain movements may be positive evidence, but there is a molecu-

* It is to be remarked that we know nothing concerning the special means employed by Mr. Dancer to secure the purity of water.—SEC'R.

lar movement common to particles of inorganic (clay, chalk, &c.), as well as to organic matter which may be mistaken for life even by experts, and the particles themselves for animated beings. I have a slide of coagulated albumen which has been prepared and closed up for seventeen months; in this there may be seen, in the field of the microscope, at one view, thousands of minute globules (too small to be distinguished with a power of 200 diameters), in constant movement. There can be no life in the matter, yet numerous experts have seen it and pronounced it life, and only one recognized it for what it is. Such things should teach caution to investigators to be not hasty in pronouncing conclusions.

In workshops and manufactories, dust may be and is present in such quantity and quality as may be supposed capable of impairing health. As for example, I examined at your request the dust deposited in the polishing shop of the U. S. armory in Springfield. It is a fine black powder. I found in it a few vegetable fibres, a few apparently organic fragments and broken crystals; but two-thirds to three-fourths of it was particles of iron, in amorphous fragments and of various dimensions from 1-100 m. m. upward, and curved and irregular fibres and masses of iron, with sharp, jagged edges, from 5 to 15 m. m.; and some very minute perfect spheres, probably iron. It can hardly be doubted that continual breathing an atmosphere charged with *such* dust must be injurious, —but that belongs to the medical profession to decide, not to me.

I thought I might separate the iron of this dust from the other constituents, by means of a magnet. To my surprise, the magnet took the whole of the dust from a white paper, as completely as could have been done with a brush. As the iron is all that is really attracted by the magnet, is it probable that all the particles of the dust are sufficiently coated with oil to be adhesive, so that they all stick together. This suggests a means by which it is likely a large portion, if not all, of the dust may be separated from the air, and thus rendered harmless. Let permanent, or, by preference, electro-magnets be placed abundantly about the grindstones and polishing wheels, and the dust will adhere.

I have only to add my regret that I have been able to accomplish so little.

Respectfully yours,

(Signed)

CHARLES STODDER.

Boston, Dec. 25th, 1870.

HEALTH OF MINORS

EMPLOYED IN

MANUFACTORIES OF COTTON, WOOLLEN, SILK, FLAX AND JUTE.

HEALTH OF MINORS.

The legislature of 1870 passed the following Resolve:—

“Resolved, That it shall be the duty of the Board of Health to specially ascertain and include in their annual report to the legislature on the whole number of minors employed in all the cotton, woollen, silk, flax, and jute manufactories in this Commonwealth, and the cause, amount and rate of mortality among them, and how it compares with the mortality of all other persons of the same age in this Commonwealth during the same periods of time, and how far the particular employment of such minors affects their general health as compared with the effects of other employments upon the general health of other persons of similar ages.”

In compliance with this Resolve the State Board of Health made application to the Secretary of the “American-House Manufacturer’s Committee,” for a list of persons or corporations engaged in such manufactures.

This information was furnished in July, 1870, and on the 1st day of August, the following circular was sent to 636 persons or corporations. (After quoting the Resolve above referred to), “Will you have the kindness to furnish the State Board of Health with replies to the following questions:—

[It is necessary to classify the ages as between 10 and 15, and 15 and 20, in order to correspond with the returns of the Registration Reports and of the Census.]

- 1.—What do you manufacture?
- 2.—How many persons of both sexes of the ages of 10 to 14 years, both inclusive, were employed by you on the 1st of August, 1870?
What was the average number during the year 1870?
- 3.—How many persons of both sexes of the ages of 15 to 19 years, both inclusive, were employed by you on the 1st of August, 1870?
What was the average number during the year 1870?
- 4.—How many deaths occurred among those of both sexes employed by you in 1870, of the ages of 10 to 14 years, both inclusive?

Of these deaths how many were caused by—

Accidents from machinery ?

Consumption ?

Other diseases ?

- 5.—How many deaths occurred among those of both sexes, employed by you in 1870, of the ages of 15 to 19 years, both inclusive ?

Of these deaths how many were caused by—

Accidents from machinery ?

Consumption ?

Other diseases ?

- 6.—What proportion of your employees of both sexes of all the above ages, remained in your service throughout the year 1870 ?

- 7.—What was the average length of service of your employees of both sexes, of all the above ages, during the year 1870 ?

[The object of the two preceding questions is to endeavor to ascertain in what degree the changes occurring among employees may affect the value of statistics of mortality.]

In addition to the above information, which we are required by the legislature to obtain, will you also give us replies to the following questions :—

- 8.—What was the percentage of absence from work on the part of your employees of all ages by reason of sickness in 1870 ?

- 9.—Which class of employees suffer least loss of time from sickness, those who live in tenements provided by you or those who live in tenements provided by others ?

- 10.—Do those of your employees who have been in the United States less than one year suffer from sickness in a greater or less degree than others ?

- 11.—In case of sickness, is it the duty of any one to see that no suffering is caused by neglect of proper attention ?

- 12.—Do you endeavor to *prevent* sickness, by providing fresh air in the work-rooms and sleeping-rooms, and by supervision of cellars, sinks, privies, cesspools and pigsties ?

- 13.—Do you limit the number of persons who shall occupy sleeping-rooms of a certain size ?

- 14.—Do you guard against smallpox, by systematic vaccination ?

- 15.—How many hours do you work in each week ?

As the report of the State Board of Health must, by statute, be presented to the legislature in January, it becomes necessary that replies to the foregoing questions should be mailed to our address on the first day of January, 1871.

Very respectfully, your obedient servant,

GEORGE DERBY, M. D.,

Secretary of the State Board of Health.

On the 20th of December, 1870, the circular was again sent to all parties above referred to, together with stamped and directed envelopes for replies.

The result of this endeavor to obtain the information required by the legislature is seen in the following abstract. The list was made up January 11, 1871, and from that time to the present, (January 16), only three additional letters have been received.

ABSTRACT OF MANUFACTURERS' REPLIES

To questions addressed to them by the State Board of Health, by order of the Legislature.

Circulars were sent to	636
Cotton,	256
Wool,	341
Silk,	21
Flax,	15
Jute,	8
	— 636
Replies were received from	218
Cotton,	97
Wool,	106
Silk,	5
Flax,	8
Jute,	2
	— 218
Returned by post-office,	23
Returned by mill owners not manufacturing,	46
Missent to manufacturers not of the above classes,	3
	— 290
Not heard from,	346

[To avoid unnecessary repetition, a general reference is here made in the following tabular replies to the corresponding numbers of the questions on pages 410 and 411.]

Second Question.

	No. of Replies.	Having none under 15.	Aggregate No. employed under 15.	Average No.	Greatest No. in any one Mill.	Least No.
Cotton, . .	94	17	2,350	30.5	265	1
Woollen, . .	96	20	1,082	14.2	185	1
Silk, . . .	5	1	77	19.2	62	1
Flax, . . .	8	4	114	28.5	49	2
Jute, . . .	2	1	80	8.0	—	—
Total, . .	205	43	3,653	22.5	265	1

Average.

Cotton, . .	89	10	2,072	26.2	286	1
Woollen, . .	99	13	1,212	14.	125	1
Silk, . . .	5	1	66	14.	52	1
Flax, . . .	8	4	117	29.2	47	1
Jute, . . .	2	—	80	40.	50	80
Total, . .	203	28	3,457	20.2	286	1

Third Question.

	No. of Replies.	No. employ- ing none under 20.	Aggregate No.	Average.	Greatest.	Least.
Cotton, . .	95	8	5,672	67.5	1,106	1
Wool, . . .	102	4	2,748	27.9	293	1
Silk, . . .	5	1	212	53.	109	1
Flax, . . .	8	—	269	33.6	125	4
Jute, . . .	2	1	78	78.	78	78
Total, . .	212	14	8,979	52.	1,106	1

Average.

Cotton, . .	93	2	5,956	65.4	1,100	1
Wool, . . .	100	2	2,859	29.2	315	1
Silk, . . .	5	—	204	40.8	100	2
Flax, . . .	8	—	233	35.4	146	3
Jute, . . .	2	—	108	54.	78	80
Total, . .	206	4	9,410	44.9	1,100	1

Fourth Question.

	Replies.	None.	1 each.	2 each.	Total.	Accident.	Consump- tion.	Other Dis- eases.	Total.
Cotton,	95	81	11	3	14	3	4	10	17
Wool,	102	100	2	-	2	1	-	1	2
Silk,	5	5	-	-	-	-	-	-	-
Flax,	8	8	-	-	-	-	-	-	-
Jute,	2	2	-	-	-	-	-	-	-
Total,	212	196	13	3	16	4	4	11	19

NOTE.—Many of the mills report no deaths in their employees during a long series of years. A considerable number say, moreover, that minors leaving their mills are lost sight of, and that whether they subsequently die, from disease or otherwise, cannot therefore be known.

Fifth Question.

	Replies.	None.	1 each.	2 each.	3 each.	4 each.	7 each.	Total.	Accident.	Consump- tion.	Other Dis- eases.	Total.
Cotton,	94	72	14	3	2	2	1	22	1	16	24	41
Wool,	104	94	6	2	1	1	-	10	1	6	10	17
Silk,	5	5	-	-	-	-	-	-	-	-	-	-
Flax,	8	7	1	-	-	-	-	1	-	1	-	1
Jute,	2	2	-	-	-	-	-	-	-	-	-	-
Total,	213	180	21	5	3	3	1	33	2	23	34	59

Sixth Question.

	Replies.	Reporting 100 per cent.	Reporting none.	Average per cent.
Cotton,	87	13	2	74.
Wool,	91	16	6	71.
Silk,	4	1	1	58.
Flax,	8	2	1	74.
Jute,	1	-	-	75.
Total,	191	32	10	70.*

* General average.

Replies to this question are given approximatively, the manufacturers reporting in some cases that they do not fully understand the question, in others that their records do not enable them to reply with accuracy, in others that they are unable to determine with greater precision; only a small minority give absolute answers.

Seventh Question.

	Replies.	Average Months.	Longest.	Shortest.
Cotton,	74	9	12	4
Wool,	80	9½	12	4
Silk,	3	8½	12	5
Flax,	5	11½	12	11
Jute,	—	—	—	—
Total,	161	9½	12	4

Eighth Question.

	Replies.	Average per cent.
Cotton,	54	2
Wool,	80	1½
Silk,	3	¼ of 1
Flax,	5	¼ of 1
Jute,	1	"Very small."
Total,	143	1½

The replies show considerable variation in the estimate of absence, the extremes being 5 per cent. and 0. The great majority admit their replies to be only approximative, while a large number explain that "absence by reason of sickness" may mean indisposition to work from many other causes. One manufacturer replies that his employees "seem fresher on Saturday night than on Monday morning." Many assert that absence in their mills has been too trifling to be reckoned.

Ninth Question.

	Those in Compa- ny's Tenements.	Those living in their own.	Doubt expressed, &c.	Total Replies.
Cotton,	22	7	62	91
Wool,	11	8	80	94
Silk,	-	1	4	5
Flax,	1	-	5	6
Jute,	-	-	2	2
Total,	34	11	153	198

Of the 152 replies to question 9, about half say there is no perceptible difference; the rest are nearly all from those who either exclusively do or do not own the tenements, and are thus unable to institute a comparison.

Tenth Question.

	In a greater degree.	In a less degree.	Non-com- mittal.	Total.
Cotton,	15	3	69	87
Wool,	16	3	72	91
Silk,	-	-	4	4
Flax,	1	1	4	6
Jute,	-	-	2	2
Total,	32	7	151	190

Those whose answers are not absolute, either misunderstand the question, and answer it "yes" or "no," instead of "greater" or "less;" or "do not employ the foreigners" referred to, or, if employing them, "do not perceive any difference."

Eleventh Question.

	Yes.	No.	Total.
Cotton,	65	27	92
Wool,	58	37	95
Silk,	2	3	5
Flax,	3	5	8
Jute,	—	1	1
Total,	128	73	—

Many of the larger mills report that they make special provision in case of sickness, in the employment of corporation physicians, hospitals, relief societies, nurses, &c. In some instances a special chamber for the sick is required to be kept in reserve in each corporation boarding-house.

Twelfth Question.

	Yes.	No.	Total.
Cotton,	89	5	94
Wool,	91	7	98
Silk,	5	—	5
Flax,	6	—	6
Jute,	1	—	1
Total,	192	12	204

The affirmative answers apply especially to the ventilation and cleanliness of *mills*, many of the replies distinctly stating that "they do not pay special attention" otherwise. In other cases careful attention is given to the sanitary condition of boarding-houses controlled by the manufacturers.

Thirteenth Question.

	Yes.	No.	Total.
Cotton,	33	59	92
Wool,	30	62	92
Silk,	4	1	5
Flax,	1	5	6
Jute,	—	1	1
Total,	68	128	196

Many of those replying in the negative do not own tenements for their employees.

Fourteenth Question.

	Yes.	No.	Total.
Cotton,	60	33	93
Wool,	37	58	95
Silk,	1	3	4
Flax,	2	5	7
Jute,	—	1	1
Total,	100	100	200

In a considerable proportion of the negative responses, the "town authorities" are said to "see to it."

Fifteenth Question.

NUMBER OF HOURS WEEKLY.	Cotton.	Wool.	Silk.	Flax.	Jute.	Total.
50,	-	2	-	-	-	2
55,	-	1	-	-	-	1
59,	-	1	1	-	-	2
59½,	-	1	-	-	-	1
60,	13	10	2	2	-	27
61½,	2	-	-	-	-	2
63,	2	2	-	-	-	4
63½,	1	-	-	-	-	1
64,	2	6	-	1	-	9
64½,	4	8	-	1	-	13
65,	4	6	-	2	-	12
65½,	-	1	-	-	-	1
66,	62	54	2	2	1	121
67,	2	-	-	-	-	2
67½,	2	2	-	-	-	4
68,	-	1	-	-	-	1
68½,	-	1	-	-	-	1
69,	1	2	-	-	-	3
70,	-	2	-	-	-	2
Average,	64.8	64.7	62.2	63.7	66	-
General average,	64.4					

The comparison of death-rates among minors in factories with death-rates among minors in the general population cannot be made in strict compliance with the terms of the Resolve, since we do not know as yet either the numbers of the people at definite ages, or the deaths among them in 1870. This is a matter of little consequence, however, since mortality rates at certain ages are very nearly the same in every year. The rates which prevailed in 1860 and 1865 (years of census) are used in the following table, and we have every reason to believe that the record of 1870 would be similar. The diminished population between the ages of fifteen and twenty in 1865, as compared with 1860, was caused by the loss of young men in the four previous years of war.

Table showing Comparative Mortality among Minors, in the State of Massachusetts at large, and those employed in mills.
IN THE STATE AT LARGE.

Y E A R.	NUMBER OF MINORS.			DEATHS FROM CONSUMPTION.			NUMBER OF DEATHS TO 1,000 OF POPULATION.			NUMBER LIVING TO ONE DEATH.		
	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.
1860, . . .	114,345	120,799	235,144	75	392	467	.66	3.24	1.99	1,525	308	504
1865, . . .	126,691	117,171	243,862	86	397	483	.68	3.39	1.98	1,473	295	505
AMONG MILL OPERATIVES.												
1870, . . .	3,457	9,410	12,867	4	23	27	1.16	2.44	2.09	864	409	477

Table showing Comparative Mortality among Minors—Concluded.

IN THE STATE AT LARGE.

Y E A R.	DEATHS FROM OTHER CAUSES THAN CONSUMPTION.			NUMBER OF DEATHS TO 1,000 OF POPULATION.			NUMBER LIVING TO ONE DEATH.			DEATHS FROM ALL CAUSES.			NUMBER OF DEATHS TO 1,000 OF POPULATION.			NUMBER LIVING TO ONE DEATH.		
	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.
1860, . .	398	484	882	3.48	4.01	3.75	287	249	267	473	876	1,349	4.14	7.24	5.73	242	188	174
1865, . .	565	731	1,296	4.46	6.24	5.31	224	160	188	651	1,128	1,779	5.13	9.62	7.29	194	104	137

AMONG MILL OPERATIVES.

Y E A R.	DEATHS FROM OTHER CAUSES THAN CONSUMPTION.			NUMBER OF DEATHS TO 1,000 OF POPULATION.			NUMBER LIVING TO ONE DEATH.			DEATHS FROM ALL CAUSES.			NUMBER OF DEATHS TO 1,000 OF POPULATION.			NUMBER LIVING TO ONE DEATH.		
	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.
1870, . .	15	30		1.84	3.83	3.96	230	261	252	19	59	78	5.49	6.27	6.06	182	159	165

The preceding table expresses the principal facts which we were directed to procure *in so far as they can be reached by the means at our command.*

Most of the larger mills have made returns. Most of the smaller mills have not. The aggregate of nearly thirteen thousand minors is certainly a very considerable proportion of the whole number employed in factories in the State.

The correspondence in death-rates between the factory population and the whole population at the same ages is remarkably close, so much so as to leave little to be said. A certain allowance is to be made for the deaths of young men in 1865, the last year of the war. But for that, the deaths from all causes between fifteen and nineteen would have been about the same in the general population in 1865 as in 1860. That this is so is apparent by looking at the deaths from consumption in those two years.

The question concerning deaths by consumption was sent to the manufacturers, because of the fact that very nearly forty per cent. of all the deaths between the ages of fifteen and nineteen inclusive are from this disease in Massachusetts every year.

The same proportion is seen to be also returned in 1870 among the mill operatives.

The result of this inquiry shows that the mortality among minors in factories, *in so far as it is expressed by the returns we have received*, is the same as in the general population.

We think, however, that such returns cannot express the whole mortality incident to factory life.

The operatives are migratory. They do not generally stay one mill a year. (See table based on the replies to question 7.)

It is reasonable to suppose that when unfit for work by reason of sickness, and particularly when gradually weakened in the first stages of consumption, a certain proportion of operatives go to their homes, or among their friends, and are lost sight of. If this is so it must surely raise the rate of mortality among minors in factories above that of minors in the general population.

On the other hand, it is to be remembered that the young operatives in our mills are drawn for the most part from a class

of foreigners who do not live under circumstances favorable to health, and whose death-rate at all ages is certainly much higher than among the population at large.

The influence of occupations on health is of the greatest interest, and its importance is fully recognized by the Board of Health. It is, however, a subject more difficult to study in this country than in any other country in the world, from the tendency of our people to change their occupations. This difficulty meets us in the present investigation.

It is hoped, however, that the facts which we have been able to collect may be found useful to the legislature and to the people of the Commonwealth.

REPORT
ON THE USE OF MILK FROM COWS AFFECTED WITH
"FOOT AND MOUTH DISEASE."

By ARTHUR H. NICHOLS, M. D., of Boston.

[NOTE BY THE SECRETARY.]

The preceding papers were presented to the legislature in manuscript on the 21st day of January, 1871. At that time the effects upon man of the "foot and mouth disease" in cattle were under investigation by the State Board of Health, but no definite results had been reached. Since that period, and while this volume was being printed, certain facts have been ascertained which it seems important to make known at once, as the disease in question still exists in Massachusetts.

The singular affection of a family in Brighton excited the attention of their physician, Dr. Marion, who reported to us early in January, his belief concerning the cause of the disease.

Dr. Nichols has since conclusively proved the correctness of the diagnosis, and has added much information on the whole subject in the following pages.

The prompt and efficient action of the Cattle Commissioners has been attended with excellent results, but in spite of their efforts it will not be surprising if the disease shall linger among us in some localities for many months to come.

BOSTON, February 23d, 1871.

THE EFFECTS OF THE USE OF MILK FROM COWS AFFECTED WITH APHTHA EPIZOÖTICA.

Aphtha epizootica, otherwise known as *vesicular murrain*, or *foot and mouth disease*, (*maladie apthongulaire*, *mund-und-klauenseuche*) is an exceedingly contagious disease which prevails among cattle, horses, sheep, deer, goats, pigs, etc., and is characterized by an erysipelatous-like eruption terminating in the formation of vesicles, pustules and ulcers. The attack is generally accompanied by slight feverish symptoms; the animal exhibits an uneasiness in standing, and an unwillingness to move, or if an attempt is made to walk, decided lameness is noticed in one or more limbs. The local symptoms are thus described by George W. Balfour, M. D.*

* Edin. Med. Jour., Feb. 1863, p. 707.

“There is generally a harsh and frequent cough, but this symptom is not invariable; the mucous membrane of the mouth is swollen, and exhibits little reddish elevations; there is a considerable flow of saliva from the mouth, and in about twenty-four hours from the first appearance of the disease, a crop of vesicles is found to be thrown out across the upper part of the mouth, along the sides of the tongue, within the lips, on the muzzle, and in the nostrils.

“Vesicles are also occasionally found around the roots of the horns, and on the external parts of generation, while they are more common in the interdigital spaces and on the udder and teats, and these latter organs are often very much involved in those animals which are far advanced in gestation or in those giving milk. These vesicles are irregular in form, and have neither the central depression nor the distinct inflammatory areola observed in true cow-pox. They are at first about the size of a millet-seed, but gradually increase in size to that of a kidney-bean, or larger. The contents of these vesicles are at first pure lymph, but within a few hours this becomes more or less opaque from the admixture of shreds of lymph and pus corpuscles. Sometimes this fluid is absorbed, and the cuticle desquamates, leaving a raw surface; at other times the vesicles burst and scabs are formed, while in severer cases ulceration occurs which may take eight or ten days to heal. These symptoms all increase till about the third day, after which they commence to decrease, and in mild cases the animal is well in little more than a week.”

The mild nature of the disease may be illustrated by an abstract of the report of Mr. Jeffs, by which it appears that the total number of diseased animals in the Bridgewater district, England, from August 20th to October 1st, 1869, amounted to 1,858 cows, 544 heifers, 431 oxen, 38 bulls and 43 pigs, none of which died.

It seems established then by these and similar observations, that a fatal termination is extremely uncommon, and even where death has taken place, it has apparently resulted not so much from the virulence of the specific poison, as from simple inanition, the ulcerated condition of the mouth and tongue preventing the animal from taking food sufficient for nourishment.

The small number of prominent symptoms, and the fact that there have appeared as yet no spurious forms of the malady,

render the affection easy to distinguish, and one case presents therefore in every essential particular a model of all others.

The above described distemper which in some unknown manner was introduced into England for the first time in 1839,* and which has recently visited this State, presents several features of more than ordinary interest. The manner of its original introduction into the town of Brighton, where it was first noticed; its radiation from this place as a central point, thus penetrating distant counties and States; the mode of its extension, at times moving regularly along through contiguous farms, at others travelling over considerable districts and appearing in remote localities; the development and propagation of the disease as affected by conditions of temperature and other atmospheric influences,—all these present practical and interesting questions for scientific investigation, the solution of which there is reason to believe, would demonstrate most forcibly the utility of “sanitary cordons” and other restrictive measures for preventing the spread of the malady, which have been recently put in operation by the State Cattle Commissioners.

The absence of accurate data renders it impossible to settle conclusively many of these points, and it is proposed therefore in this article to answer merely one question which meets us at the very threshold of all inquiry, viz : in what manner can the disease be communicated to human beings ?

It has long been known to medical men, that children who had been fed with the milk of affected cows, were not unfrequently attacked with vomiting and diarrhœa, but it was maintained that these symptoms might be explained without assuming that the specific poison of the disease had been communicated, since it has been remarked that at the height of the disease, the milk very soon turns sour; it also coagulates upon being boiled, or having its temperature very slightly raised, and moreover has been found at this time to contain pus corpuscles,† and it was thought therefore, that these facts

* Veterinarian, Vol. XIV., p. 184.

† It has not yet been satisfactorily ascertained whether these corpuscles are secreted with the milk, or (as would seem more probable) they derive their origin from the pustules on the udder, and are transferred to the pail by the process of milking. A microscopical examination was made of the milk from one cow seen at Brighton, which was recovering from a severe attack. In this instance neither pus nor parasitic growths were detected, but the milk was found to be sour four hours after it was secreted.

alone were sufficient to account for the above intestinal disorders. The recent outbreak in this State has afforded strong additional evidence that the use of such milk may be followed not only by lesions of the mouth and intestines, but also by a well-marked cutaneous eruption, as shown by cases which occurred in the practice of Dr. H. E. Marion, of Brighton, by whom the method of the introduction of the contagion was distinctly traced.

It seems that shortly after the malady appeared in the cattle-yards at Brighton, it attacked fourteen cows, constituting a dairy which is situated over a mile from the yards. Attention was first attracted to one of the cows from the fact that she refused to eat, and upon examination the entire inner surface of the mouth was found to be covered with a slimy secretion, and numerous ulcers were seen on the lips and tongue. Although this animal was immediately removed from the barn, the others were soon after seized in like manner. It is certain that after the appearance of the disease in the first cow, the milk was for a while consumed as usual, the symptoms not having become sufficiently developed to enable their true nature to be recognized by the milkers,* so that there can be no doubt that the milk of one diseased cow, together with that of thirteen others, at that time unaffected, was distributed to various families, during a period not exceeding two or three days.

In one family, the members of which partook freely of milk from this source, a peculiar disease broke out in the course of five or six days, causing at the same time similar and well-marked symptoms in no less than three individuals, all adults. These symptoms consisted of loss of appetite, nausea, slight acceleration of the pulse, swelling of tonsils and sub-maxillary glands, the appearance of a few vesicles upon the lips and tongue, and a singular cutaneous eruption on the lower extremities, consisting of clusters of papules, vesicles, pustules and ulcers of different sizes,—the latter characterized by a dark-red color, while their peripheral margin was slightly elevated and inflamed. These appearances, in varied stages of development,

* In justice to the proprietor of this dairy (whose pecuniary loss has been heavy), it should be stated, that as soon as the true character of the disease became known, he at once notified all families supplied by him, and ordered all the milk subsequently obtained from diseased animals to be thrown away.

were all seen at one and the same time, indicating that a fresh outbreak of vesicles was taking place as rapidly as the old ones disappeared. In each instance the eruption was confined to one limb, in two instances appearing upon the front and side of the thigh, and in the other just below the knee, and although attended by no great constitutional disturbance, was, nevertheless, rather tedious in its progress, lasting six or seven weeks.

Inquiries were instituted with the idea of ascertaining whether other cases, traceable to this infected farm, existed in the town, and it transpired that another less pronounced instance of the disease occurred at exactly the same time, in a woman who had been supplied with milk from this dairy. Dr. Braman, of Brighton, by whom the case was observed, furnishes the details, as follows :—

“The symptoms here noticed were an efflorescence upon both lips, which at a distance looked swollen and everted, and on closer examination were found to be studded with minute vesicles and aphthous patches; decided swelling of the mucous membrane of the gums and nasal cavity, pain and tenderness in the region of the abdomen, and diarrhœa.”

In order to demonstrate more conclusively the specific nature of the cutaneous eruption, quills were charged with the contents of these vesicles in the human subject, and the poisonous element was in this way transferred to the bodies of two young rabbits. At the expiration of two days, the inner surface of the upper lips was found to be swollen and covered with a bloody discharge; later, several small white specks were formed upon the inflamed spots, and the animals were seized with convulsions and died, one in three, the other in four days from the time of inoculation.

Portions of the same lymph were next introduced by the ordinary method of scarification into the arm of a healthy man. In two days vesicles began to form at two of the three points of inoculation, similar to those upon the thigh of the woman from whom the lymph was obtained. In four or five days more, these vesicles, having attained the size of a large split pea, were

ruptured, and in their places appeared unhealthy-looking ulcers, which instead of healing, continued to increase in size.*

The fact that the milk of diseased cows may produce an eruption on the surface of the body of human beings, analogous to that developed in animals, has been satisfactorily shown by Professor Hertwig,† of Berlin, in a series of experiments performed upon himself. He began by drinking daily a quart of fresh milk taken from a diseased cow, and upon the second day experienced a slight fever, contractions of the limbs, headache, heat and dryness of the mouth, and an itching sensation in hands and fingers. Five days later, the mucous membrane of the mouth and tongue became perceptibly swollen, and small vesicles appeared. These vesicles increased in size for a few days, and at last burst, leaving in their place dark apthous patches, which did not disappear for a considerable length of time. Upon the *hands* and *fingers* moreover, vesicles appeared which afterwards burst and dried up in the same manner. Similar experiments were performed by Jacob,‡ at Basle, in which case vesicles were formed upon the chest.

Two cases reported by Dr. J. B. Hislop§ are in this connection, interesting on account of the anomalous character of the eruption :—

“In August, 1862 Mrs. X., the wife of an extensive farmer came under my care, on account of an eruption of bright red spots one-eighth of an inch in diameter, covered with a thin white desquamation, which were so thickly sprinkled over her feet, legs, thighs, and the lower part of her body as to leave only minute interspaces of sound skin. * * * * *

“On a subsequent visit to my patient I found her husband complaining of sore mouth and throat. Upon examination I found the mucous membrane of his lips, mouth, tongue and throat studded with small ulcers giving off a white slough, which left behind it a clean but highly-sensitive cup-shaped cavity; his forehead was also

* At the present date, (Feb. 22,) twelve days after inoculation, these ulcers have given no indication of healthy action, so that their unequivocal character leaves no doubt as to the contagiousness of the affection, thus distinguishing it from other forms of cutaneous eruption, which though somewhat similar in appearance are nevertheless non-contagious.

A. H. N.

† Medicinische Vereinszeitung, 1834, No. 48, p. 226.

‡ Journal de Médecine Vétérinaire, pub. à l'Ecole de Lyon, Tome II., 1846.

§ Edin. Med. Review, Feb. 1863, p. 704.

covered with an eruption similar to that upon the lower extremities of his wife. As this peculiar combination of symptoms in parties so closely connected was to say the least of it remarkable, I made strict inquiries, and distinctly ascertained that the only cause that could be assigned for this peculiar affection was the circumstance that the whole of Mr. X.'s cows were at that time laboring under the vesicular murrain (*Aphtha Epizootica*). * * * *

"I subsequently ascertained upon inquiry the various other individuals employed about the cattle had suffered from similar symptoms, though in a less degree. * * * *

"Several of the children about the house were also affected with sore throats, but the symptoms in their case were mild. * * * The family were in the habit of freely using the milk fresh from the cows."

The disease is also capable of being communicated by direct contagion, by means of the viscous secretion from the mouths of animals, as well as by the contents of the vesicles.

Hildebrandt* relates instances where contact with these secretions has produced aphthous eruption in the mouth, conjunctivitis, and a pemphigus-like eruption on various portions of the skin. Broschet† reports the case of two girls who had milked cows with diseased udders, upon whose fingers and toes there appeared swollen spots, upon which spots were afterward formed vesicles, analogous to those on the udders of the cows which they had milked.

The above views may be thus stated in a condensed form.

1. It is proved that *Aphtha Epizootica* may be communicated to man through the medium of diseased milk, as well as by direct contagion.

2. The disease produced in human beings by the use of this milk is not usually to be dreaded, for it is by no means formidable; it is generally limited to a sore mouth, and in very rare instances is accompanied by an eruption on the surface of the body. The use of such milk by feeble persons and young children might however be followed by more serious consequences.

In no well ascertained case has it been found that any ill effects have been produced by eating the flesh of diseased animals, although there is abundant evidence that at the outbreak

* Magazine für Thierh. 1840. VI. 2.

† Die Maul und Klauenseuche der Rinder, etc. Dresden, 1820.

of the distemper in Massachusetts, and before public attention had been directed to its true character, a considerable number of animals, in which the usual premonitory symptoms had appeared, were slaughtered and their flesh sold.

In accordance with the general law that animal poisons are destroyed when subjected to a very high temperature, we are justified in believing that the affection can never be communicated to man through the medium of the meat, provided it be thoroughly cooked, and upon the same principle the milk might be rendered innocuous by being boiled.



